

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

FILED

BALLY MANUFACTURING CORPORATION,

Plaintiff,

v.

D. GOTTLIEB & CO., WILLIAMS
ELECTRONICS, INC. and ROCKWELL
INTERNATIONAL CORPORATION,

Defendants.

and

BALLY MANUFACTURING CORPORATION,

Plaintiff,

v.

GAME PLAN, INCORPORATED,

Defendant.

DOCKETED

DEC 30 1983

H. STUART CUNNINGHAM

At _____ o'clock

CLERK

CIVIL ACTION NO. 78 C 2246 ✓

Judge John F. Grady

CIVIL ACTION NO. 79 C 713 ✓

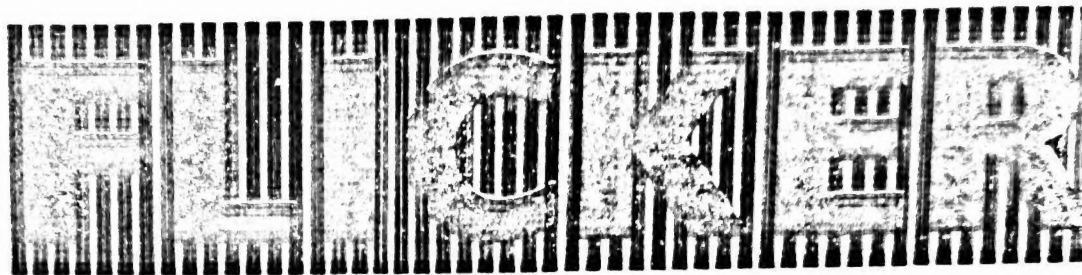
PLAINTIFF'S TRIAL BRIEF
EXHIBITS A - N

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Jerold B. Schnayer
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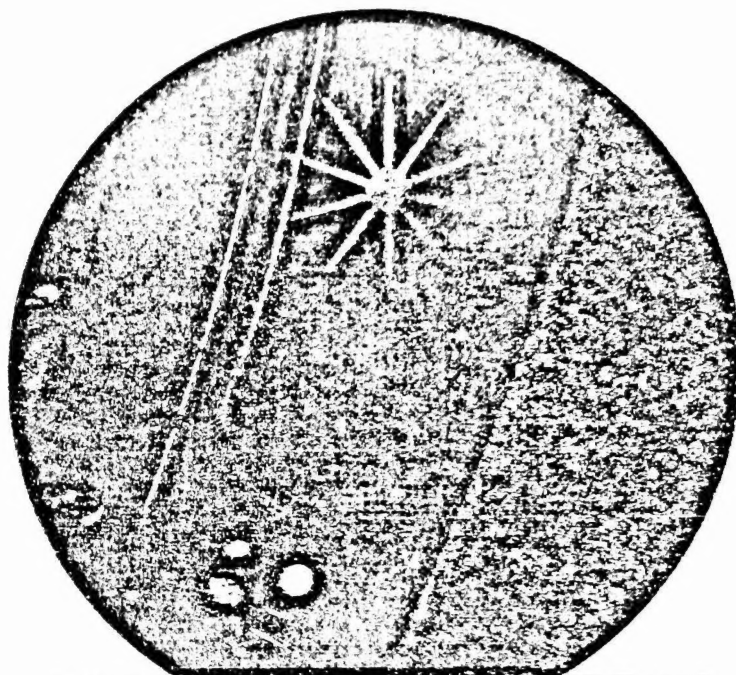
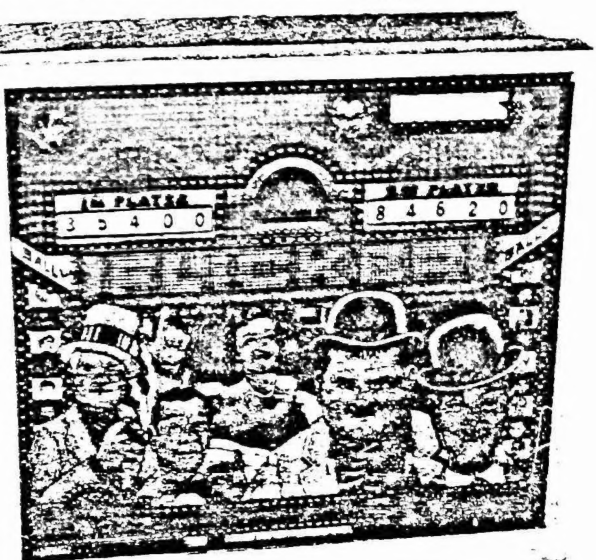
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Bally®

-PLAYER PINBALL



CONVERTIBLE TO ADD-A-BALL



NEW JUMBO LIGHT-UP BUTTONS

Compare size of new Button with ball. Jumbo size and light up feature of new Button adds to eye-appeal flash, play-appeal action.

TWIN SPECIAL TARGETS

TWIN EXTRA BALL ROLLOVERS

DOUBLE BONUS

OUT-HOLE BONUS

KICKOUT ACTION



See other side for FEATURE-GRAM

KICKOUT ACTION

Kickout Hole at top of playfield scores 1,000, kicks ball back on field with sizzling action.

TWIN SPECIAL TARGETS

Target at top of Upper Left and Right Lanes scores Special if hit when lit. Targets can be hit only by captive ball in each Lane, captive balls being propelled by impact of ball in play. Special lights when Bonus is at 15,000, remains lit until ball enters out-hole.

NEW JUMBO LIGHT-UP BUTTONS

Compare size of new Button with ball. Jumbo size and light up feature of new Button adds to eye-appeal flash, play-appeal action.

OUT-HOLE BONUS

Bonus advances from 1,000 to 15,000, advancing 1,000 each time ball hits one of 11 Bonus-boosting targets. The highest lit Bonus remains lit until collected by ball entering out-hole.

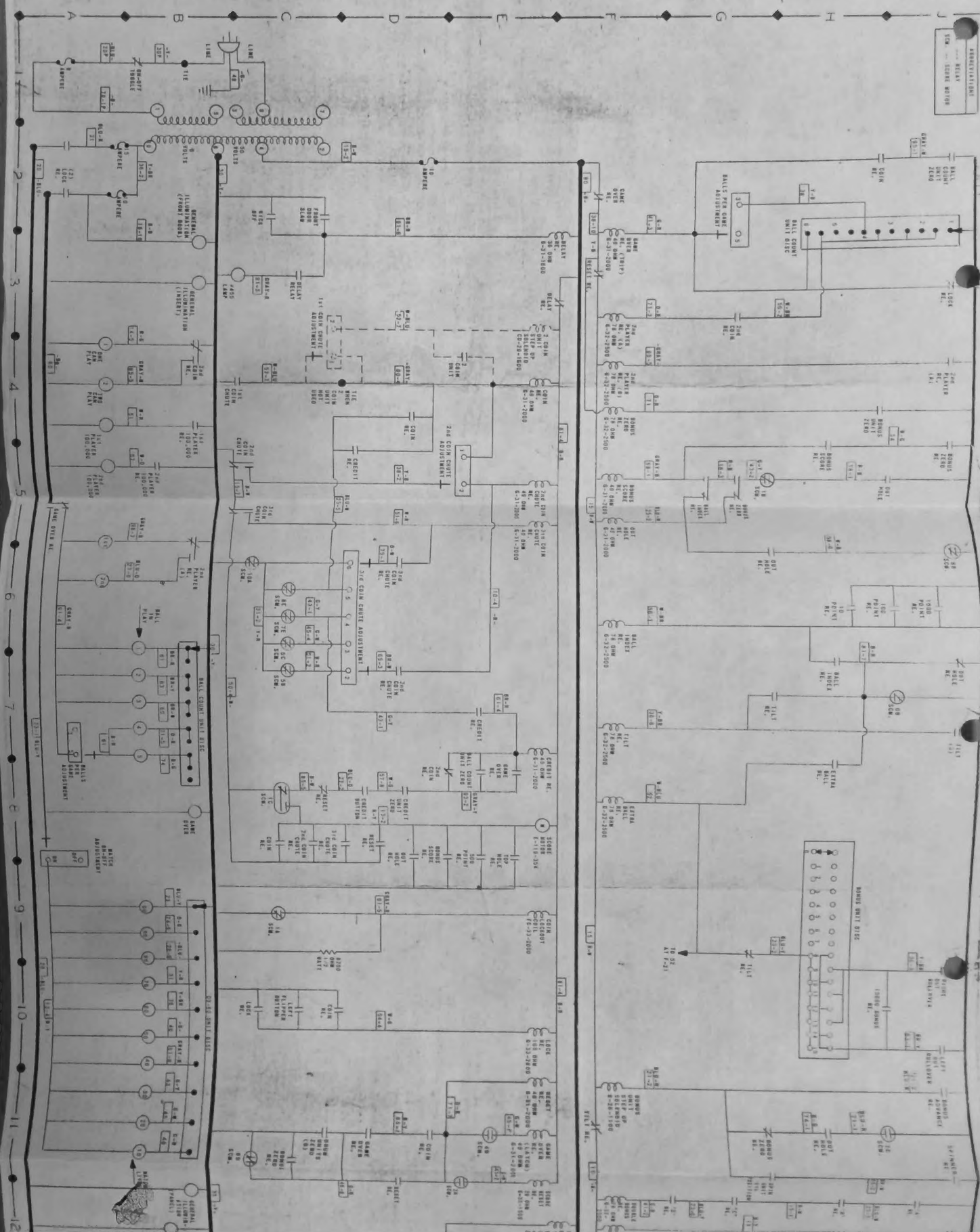
DOUBLE BONUS

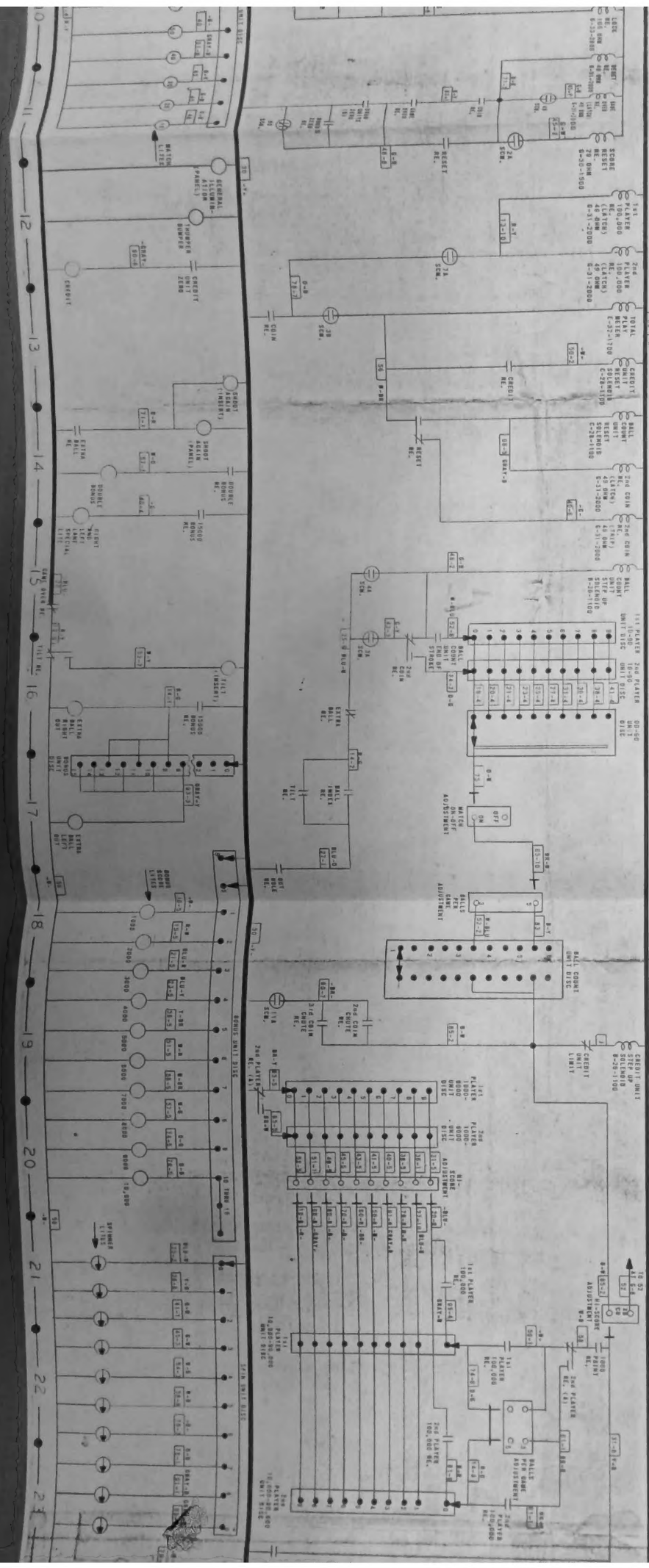
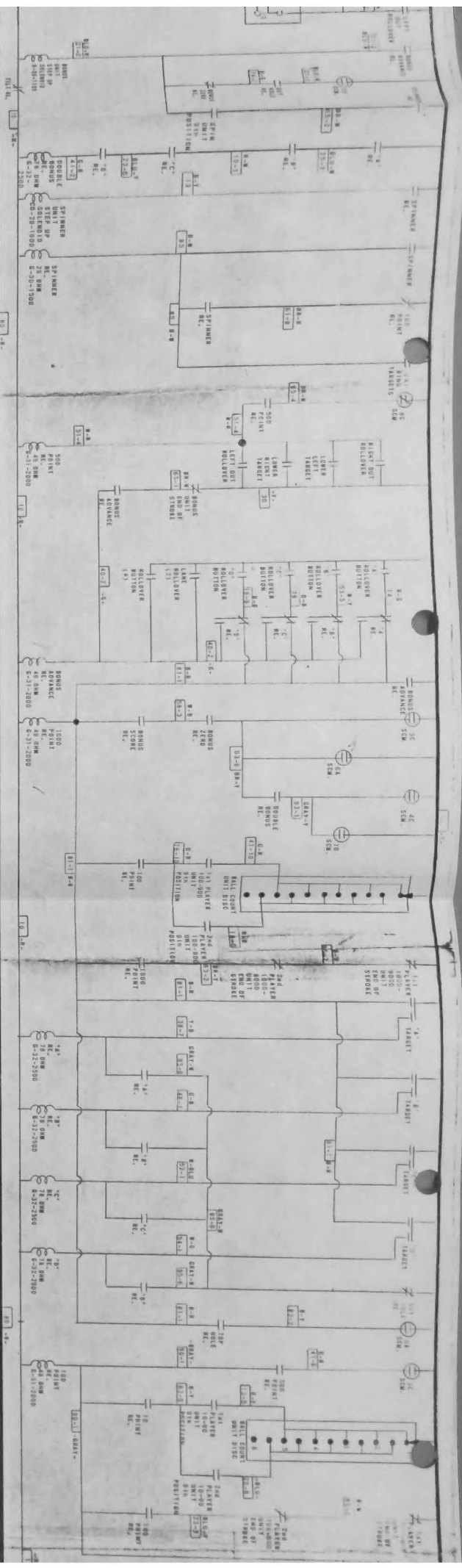
Bonus is doubled if collected when Double Bonus is lit by hitting A, B, C, D Targets.

TWIN EXTRA BALL ROLLOVERS

Extra Ball is delivered to shooter-tip when ball in play exits through Left or Right Out Lane when Extra Ball Light is lit. Extra Ball Light is lit at various Bonus scores.

3 BALLS PER PLAYER
3 PLAYS 25c





EXAMINE TO ORDER PLATES

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	12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AN INTRODUCTION
TO
Bally
FLIPPER GAMES



Bally MANUFACTURING CORPORATION
2640 Belmont Avenue • Chicago, Illinois, 60618, U.S.A.
TELEPHONE (312) 267-6060/TELEX NO 253075/CABLE ADDRESS BALEFAN

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INTRODUCTION

It is the purpose of this outline to summarize the essential component that make up a coin operated amusement game. It is written, primarily to provide a foundation and background for the men who service these games. No one can hope to memorize every detail of every circuit and component in today's great variety of games. A good technician does not even attempt it. Instead he should be able to obtain information as he needs it, from the instruction sheets, drawings and schematics provided with each particular game. To do this, he must be able to read and interpret the schematic diagram. The ability to read a drawing, coupled with the basic principles of electricity will make it much easier to understand, adjust, operate and repair ANY GAME or electrical device.

UNDERSTANDING SCHEMATIC CIRCUITS

The schematic circuit is a complete drawing of all the individual electrical circuits. A shorthand system of symbols and lines are used. The symbols represent switches, coils, fuses, etc. The lines indicate how these are connected together.

A knowledge of the mechanical movement of the components that actuate the various switches is necessary. Not all the switches of a component assembly are close together on the schematic drawing. The switches of an assembly are divorced and shown individually in only that circuit in which it is used. At first glance the schematic may look complicated. Actually it is nothing more than a collection of many simple circuits, each designed to do a particular job. In trouble shooting, it is important to isolate the problem. Reference to the schematic is then made only to those circuits that apply.

TROUBLE SHOOTING

Never experiment with any of the mechanism. Improper adjustment, or makeshift repair, will only cause serious damage to other parts of the machine, or repeated failure of the part.

To service any coin operated amusement game in a minimum of time, it is necessary to isolate the problem to a particular circuit. A system of logical elimination will reduce the possible trouble spots.

This is done by attempting to play the game and observing the results. With a little reasoning, a brief reference to the schematic and perhaps a continuity check will inevitably determine the cause.

A visual inspection of the components in the possible trouble area may often save time. Always look for a possible loose wire, bad connection at plug or socket, and broken or unhooked springs on step-ups, relays, etc.

SAFETY

Certain safety requirements should be kept in mind when a coin machine is being serviced. It is important to remember that current is the electrical shock factor rather than the amount of voltage. Current flow is equal to the voltage divided by the resistance. When the skin is wet or moist the contact resistance may drop to as low as 300 ohms. With this low body resistance even a relative low voltage can supply enough current to be fatal. Do not work on any electrical equipment with wet hands or while wearing wet clothing or shoes. Shoes with well insulated soles and heels should be worn.

Cleaning solvents, when used, require certain safety precautions also. Volatile liquids such as benzol, turpentine and kerosene can be dangerous because of the possible igniting of fumes by a spark. If these liquids are to be used, be sure the game is turned off, and that there is sufficient ventilation to avoid an accumulation of fumes, and that all fumes are cleared before the game is turned on.

Carbon tetrachloride , although it does not create a fire hazard, is dangerous because of the ill effects of breathing its vapor. It may result in headache, nausea or dizziness. In a poorly ventilated space it can cause unconsciousness or even death.

Available at many local electrical or radio supply houses are many commercial solvents for electrical and mechanical equipment. These leave no residual deposits, are non-inflammable and come in convenient spray cans.

TERMS AND DEFINITIONS

ACTUATOR

- That portion of a device that operates a switch.

ADJUSTMENT

- The spacing of contacts on switch blades in a switch assembly. The placement of certain levers, pawls, stop brackets, posts, etc.

ARC

- The discharge of electrical energy through a gas such as Air.

ARMATURE

- A moveable piece of metal attracted by a magnetic field.

BACK-UP BLADE

- An auxiliary blade to dampen the vibration of its adjoining operating blade.

BALL EJECT SOLENOID

- The solenoid to operate mechanism to kick ball out of a hole or pocket.

BALL SHOOTER

- The spring loaded rod, operated by the player, to propel the ball into the play-field area.

BANK

- A number of relays mounted into a common assembly.

BLADE

- A highly conductive spring type metal in the use of a switch.

BONUS SCORE

- An accumulated score added to the total score, when a certain feat is accomplished.

BUMPER

- A round plastic assembly mounted on the playfield, with an attached stem to operate a switch when hit by a ball.

BUMPER SKIRT

- Lower circular part of a bumper which moves when struck by a ball.

BURNISHING TOOL

- A non-abrasive strip coated with minute particles of metal used to clean switch contacts.

CAM

- A metal, plastic or bakelite disc with notched dwells or lobes, attached to a motor shaft or extension of a motor shaft. The disc operates associated switches when motor is operating.

CIRCUIT

- A closed network of conductors thru which an electric current can flow.

COIL

- Many turns of insulated wire wound on a spool. Used to create a magnetic field when energized.

COIL STOP or CORE PLUG

- A small assembly at the bottom of a solenoid which is used as a stop for the plunger.

COIN CHUTE

- Mechanism that tests coin for size, weight, and material before passing thru to actuate coin switch.

COIN LOCKOUT COIL

- A device mounted on the coin chute assembly that allows coins to drop to the coin chute switches when the coil is energized. When not energized, the coins are rejected and returned to player.

CORE

- The stationary soft iron in the center of a coil winding, as in a relay or transformer.

CURRENT

- The flow of electrons caused by an electrical force called voltage. The amount that will flow for a given voltage is dependent on the electrical impedance of the circuit. The unit of measurement of current is ampere.

DISC

- The stationary bakelite piece to which rivets or etched copper laminate is attached. Used on step-up units, drum units, motor units, etc.

DRIVE ARM

- The step-up lever that is operated by the solenoid plunger to advance the ratchet gear.

DRIVE PAWL

- Attached to the drive Arm, it engages the next tooth of the ratchet gear to advance when solenoid is de-energized. Advancing the ratchet is done by spring connected to the drive arm and drive pawl.

ESCAPEMENT PAWL

- Used to single step reset type unit, it allows the ratchet to return only one position when the reset pawl is disengaged.

FLIPPER

- Electrically operated bat-type lever, controlled by player to manipulate the ball on the playfield.

GAP

- Air space between a set of contact points.

GATE

- A one way device that allows the ball to enter the playfield or an alley on the playfield and acts as a rebound in the opposite direction. Also an electrically operated device that will allow the ball to enter ball shooter alley and be shot again without being counted.

HOLD OVER

- Generally a feature of the game that is not reset at the beginning of a new game, rather it is carried on until the feature award is earned. Hold over may also apply to a feature of the game that resets at the start of a game, but is carried over from ball to ball during a game. It may be a hold over until the start of a game or it may be a hold over until the feature award is earned. Carried over more than one play on the machine.

INSERT

- The panel mounted in the back box on which drum units, lites, relays, other units are mounted.

INSULATOR

- A material that does not conduct electrical current.

INTERLOCK RELAY

- A relay consisting of two coils whose armatures are mutually locked in mechanically.

LATCH

- A mechanically locking device.

LITE BOX

- The wooden box mounted on the rear of the cabinet. Sometimes referred to as a back-box.

LINK

- Connecting piece between two moving parts.

LOCK ARM

- A mechanical latch device on a step-up unit to insure full return (index) of the ratchet upon reset. Sometimes called a catch pawl or a reset latch.

LOCK IN

- A term applied when a relay is kept energized thru a switch of its own, after the original source of energy has been removed.

MAGNET COIL

- A coil wound around a stationary soft iron core, such as a relay coil.

MOUNTING PANEL

- The board located on floor inside cabinet used to mount transformer, score motor unit, relays, units etc.

OUT HOLE

- Refers to hole or cup at bottom section of playfield located under bottom arch. During play of game, the ball is kicked out of outhole by the outhole kicker, over the ball trough to shooter or alley.

PLAYFIELD

- Play area of game.

PLUMB TILT

- Pendulum type tilt switch generally located on cabinet to left of coin box.

PLUNGER

- A soft iron rod that is attached to the solenoid's magnetic field. This movement is linked to do mechanical work.

RATCHET

- A circular notched (geared) piece of metal or plastic used to rotate step-up unit.

REJECTOR

- (see coin chute).

RELAY

- An electrically operated component that can control two or more circuits from the completion of one circuit.

REPLAY BUTTON

- Mounted at the front of the game and used by the player to start a new game without the use of a coin.

RESET PAWL

- Holds the ratchet in position between step-ups so that the wiper assembly is centered on rivets. Also prevents the ratchet from resetting between step-ups on a reset type unit. Sometimes referred to as a index pawl.

RESIDUAL

- The unwanted left-over magnetism left in the armature after the electrical energy has been removed.

RESISTANCE

- Property of matter that restricts or impedes the flow of electrical current. Measured in units called ohms.

SCHEMATIC

- Drawing showing complete wiring of all components by means of a shorthand system of symbols and lines.

SEQUENCE

- A definite pre-determined pattern or order of operation.

SHOOTER

- Spring loaded rod operated by player to propel ball from shooter alley onto playfield.

SLAM TILT

- Switch assembly with an attached weight to the end of the long blade, so that switch will "make" when game is jarred or bounced.

SLEEVE

- A replaceable liner inside a solenoid.

SLO-BLO FUSE

- A delayed action fuse. Can withstand a momentary surge of high current, but will open up if the excess current is sustained.

SOLENOID

- A coil of insulated wire with a hollow core into which a plunger is pulled when coil is energized.

STEP-UP UNIT

- An electrically driven rotary type of switch.

SWITCH SPACERS

- Small bakelite pieces separating one switch blade from another.

THUMPER BUMPER

- Bumper that automatically kicks the ball when ball hits bumper skirt.

TORSION SPRING

- Spring around a shaft that winds up as the shaft is rotated.

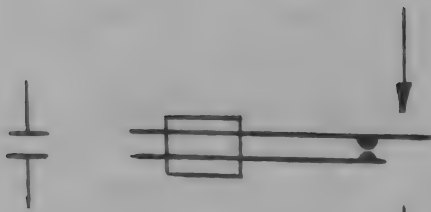
TRANSFORMER

- An electrical component consisting of two or more coupled windings, with or without a magnetic core for inducing mutual coupling between circuits.
Primarily used to change voltage ratios up or down.

WIPER ASSEMBLY

- The rotating contact blades that complete the circuit of a step-up unit disc assembly.

SYMBOLS



Normally open, closed when energized, make or type A sw.



Normally close, open when energized, break or type B sw.



Transfer, make-break or type C sw.



Double make, make-make or type D sw.



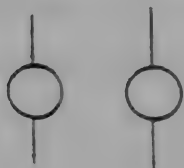
Score Motor Operated Switch.



Fuse



Motor



Lites



Line Plug

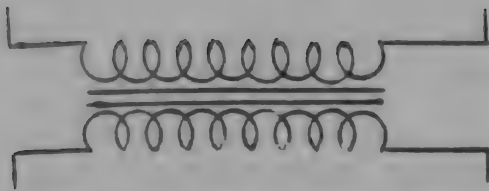


Grounding Connection



Coil (relay coil or solenoid)

SYMBOLS



TRANSFORMER



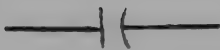
WIRES CONNECTED



WIRES NOT CONNECTED



RESISTOR



CAPACITOR or CONDENSER



DIODE or RECTIFIER

BALLY WIRE COLOR CODE

1. RED	(-R-)
2. BLUE	(-Blu-)
3. YELLOW	(-Y-)
4. GREEN	(-G-)
5. WHITE	(-W-)
6. BROWN	(-Br-)
7. ORANGE	(-O-)
8. BLACK	(-B-)
9. GRAY	(Gray)
0. No Tracer	
J. Jumper	

Dash before abbreviation used
only when there is no tracer.

First number = wire body color
Second number = tracer color
Third number = re-use of same color wire.
(after dash)

EXAMPLE:

50 = White wire with no tracer
51 = White wire with red tracer
51-1 = White wire with red tracer used 2nd time
51-2 = White wire with red tracer used 3rd time

LUBRICATION

Over-lubrication causes far more trouble in coin-operated equipment than under-lubrication. Practically all cases of poor contact on switches and wiper discs are due to oil or grease, or oil vapor which forms a film or residue on the contacts and will not allow current to pass through. Excess lubricant may also seep into the clutches, causing them to slip.

IMPORTANT: NEVER USE VASELINE FOR LUBRICATION OF ANY PART OF THE MACHINE. Vaseline is not a true lubricant. It leaves a dirty and gummy residue and it becomes very thick when cold. A special Coin Machine Lubricant is supplied with each machine.

Step-up levers, Ratchets, Cams, Shafts and other sliding or oscillating parts should be very lightly greased with special Coin Machine Lubricant (supplied with machine) not oftener than every six months. The bakelite discs on the Motor Units and Step-up Units will require lubrication with the special Coin Machine Lubricant only after the grease is completely evaporated (3-12 months, depending on climate) or when the film of grease becomes dirty. In either event, clean the parts thoroughly with a solvent and a clean soft cloth, then apply an extremely thin coat of the special grease with a fine camel's hair brush.

Solenoid Plungers should not have a lubricant of any kind. Should there be a sluggish tendency or if plungers are sticking, the parts should be cleaned with a solvent and flaked graphite applied on re-assembly.

SWITCH CONTACTS

The contact points, as used on the switches, are generally made of silver which has a high conductivity of electrical current. In some cases, various alloys of silver are used such as a combination of 85% silver, 15% cadmium, 83% silver, 17% cadmium oxide. Certain alloys are used for specific requirements such as high current, low resistance, etc. If point replacement is necessary be sure to replace with the proper equivalent.

Whenever a replacement point is set, it is important that the underside of the point is peened carefully so that it is seated evenly and tightly. This increases the current carrying capacity to its maximum efficiency. A loose point will cause arcing and burning of the blade, eventually the point will fall out. When the contact area of the point becomes dirty, or pitted, a burnishing tool should be used. Filing of the points is not recommended, as the grooves, caused by the file, tend to increase the arcing resulting in a premature short life.

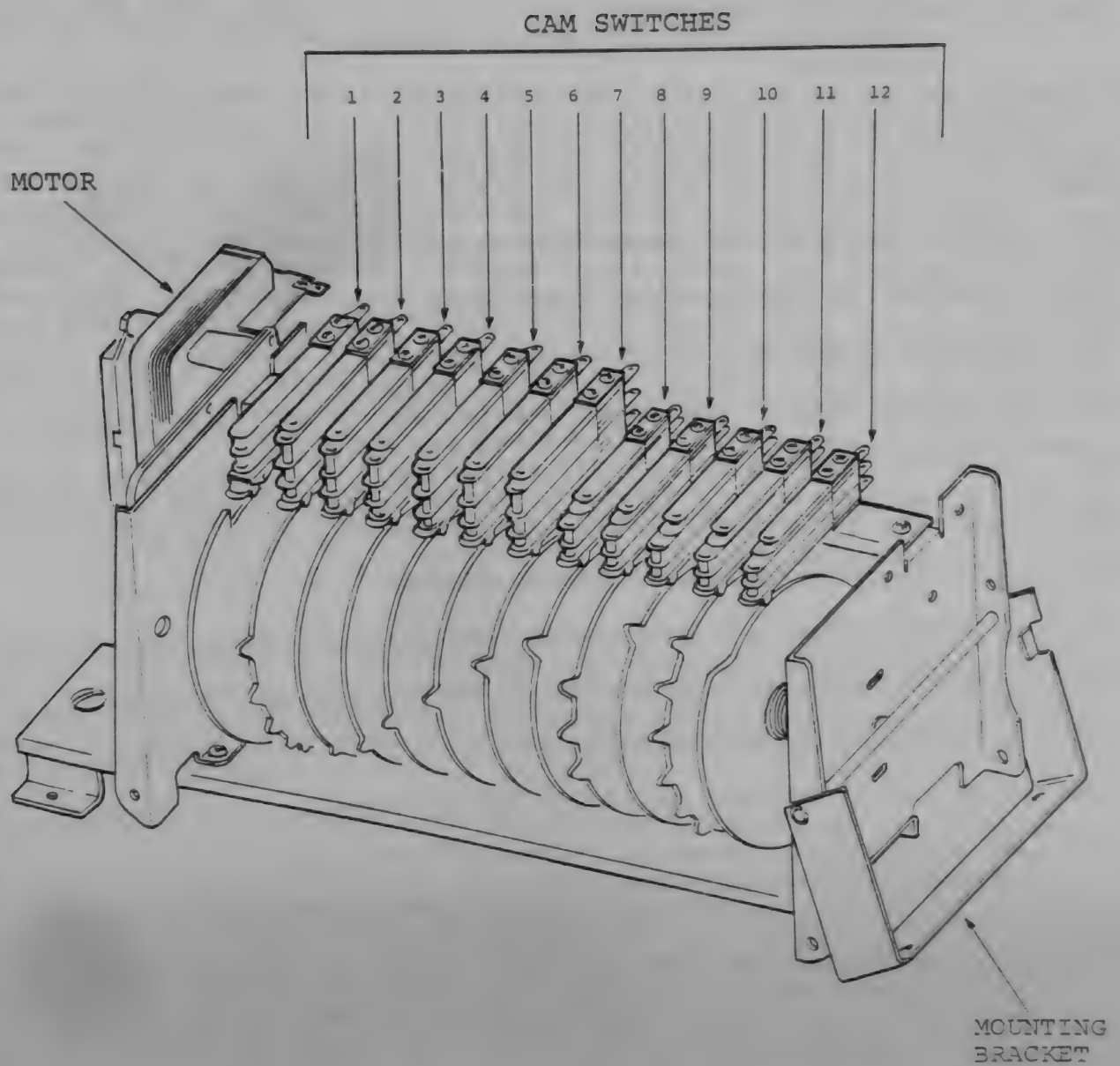
SCORE MOTOR UNIT

The score motor unit controls the sequence of the various circuits. This is accomplished by a motor driven set of cams that operate their respective switches in a fixed pattern.

This assembly is used in every pinball game and consists of a frame, a motor, and cams, mounted on a common shaft, the cams are numbered in sequence starting with #1 cam closest to the motor. The cam switches are lettered alphabetically starting with "A" for the bottom switch of a switch stack. For example, switch "3B,SCM" is a switch on the score motor unit (SCM), operated by #3 cam (3), and is the second switch (B) from the bottom of the switch stack.

The motor has to receive a starting pulse from various sources; however, it will cycle itself, one half revolution (180 rotation) by means of motor run switch on #1 cam.

SCORE MOTOR



SCORE MOTOR UNIT (typical)

Components:

Frame
Motor (26 RPM) (Normal cycle is $\frac{1}{2}$ revolution)
Cams (11 or 12 cams)
Switch assemblies (varies with games)

Purposes:

Program sequence
Pulsing
Timing

CAMS

$\frac{1}{2}$ CYCLE

#1	Index cam also carry-over for motor run	(dwell)
#2	5 pulse cam for scoring, resetting, etc.	(5 lobes)
#3	1 pulse, same as 1st of #2 cam pulses	(1 lobe)
#4	1 pulse, same as 2nd of #2 cam pulses	(1 lobe)
#5	1 pulse, same as 3rd of #2 cam pulses	(1 lobe)
#6	1 pulse, same as 4th of #2 cam pulses	(1 lobe)
#7	1 pulse, same as 5th of #2 cam pulses	(1 lobe)
#8	1 pulse, after 5th pulse of #2 cam pulses	(1 lobe)
#9	3 pulse, same as 3rd,4th,5th of #2 cam pulses	(3 lobes)
#10	1 pulse, after #8 cam pulse	(1 lobe)
#11	6 pulse, in between pulses of #2 cam pulses	(6 lobes)
#12	Alternating (if used) - cam switch is closed on $\frac{1}{2}$ revolution and open on other.	

'G' TYPE RELAYS

COIL DESIGNATIONS

#G-31-2000

INDICATES NUMBER OF TURNS

INDICATES SIZE OF MAGNET WIRE

INDICATES SIZE OF COIL

SWITCH
ACTUATOR

ARMATURE

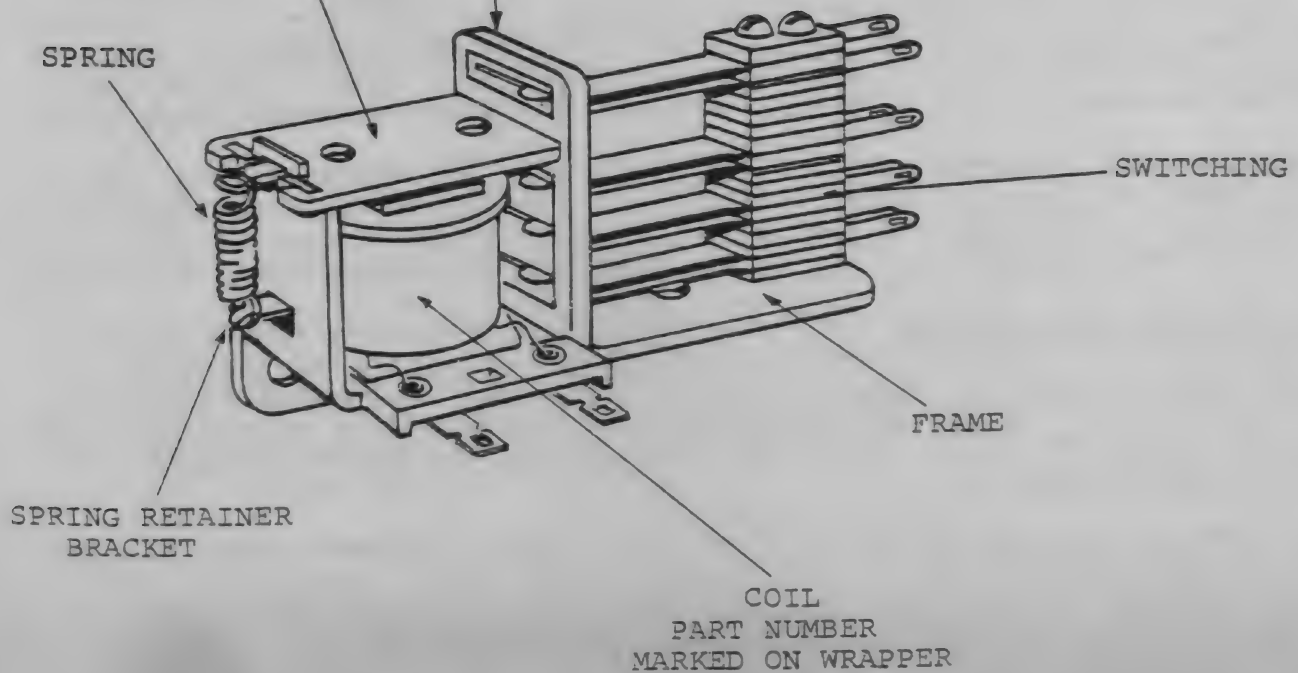
SPRING

SWITCHING

FRAME

SPRING RETAINER
BRACKET

COIL
PART NUMBER
MARKED ON WRAPPER



MOTORIZED TRIP RELAY BANK

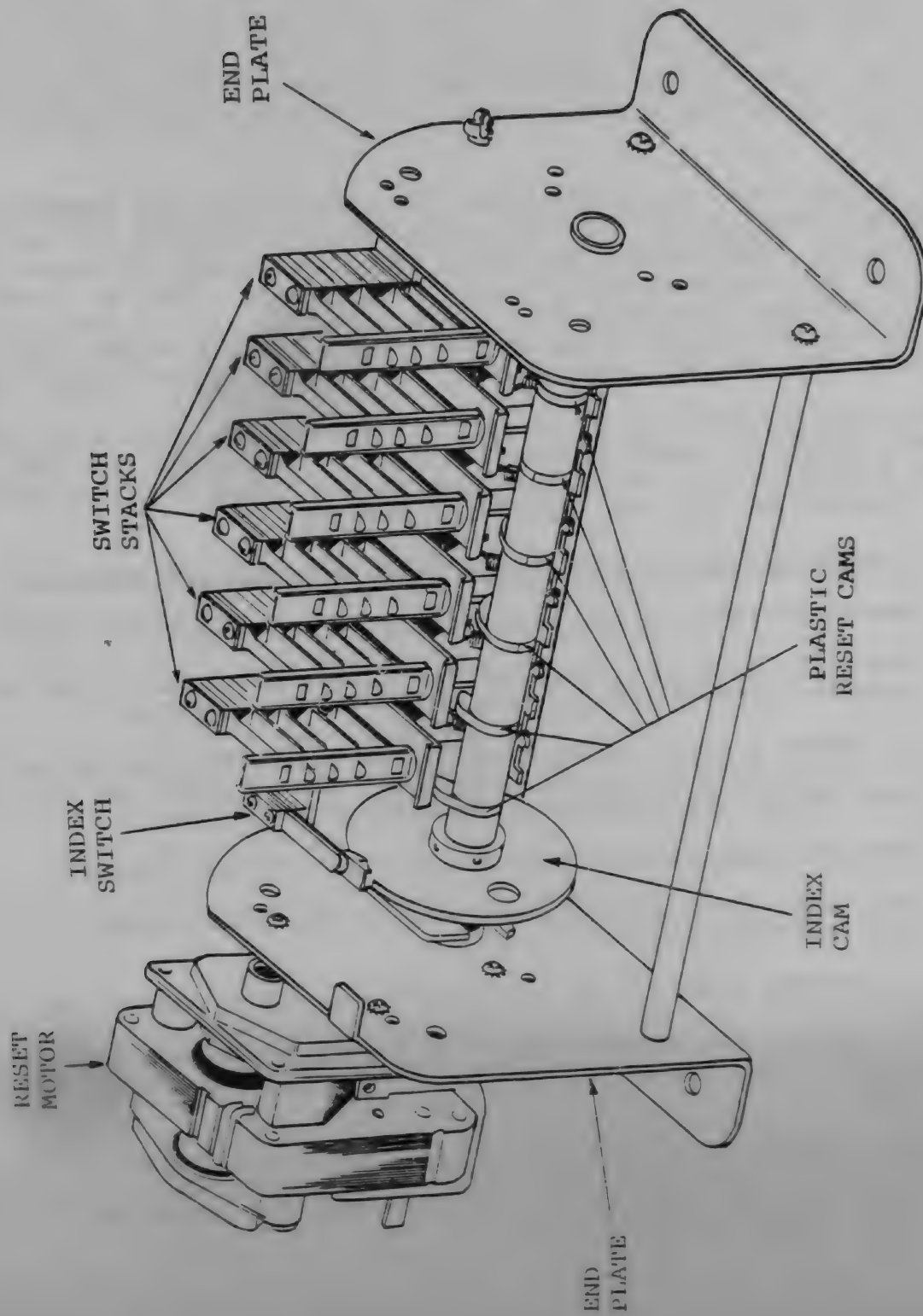
The motorized trip relay bank assembly was designed and patented by BALLY, primarily to eliminate the 115 volts from the operating circuits of a game and to insure a positive reset of all trip relays. A trip relay bank consists of a number of relays on a common frame, a main relay mounting plate, plastic reset cams on a common shaft and a reset motor. The trip relays are reset when reset cams are operated by a 50 volt motor usually 35 R.P.M. Each cam raises an individual relay latch assembly momentarily, allowing the armature to hold it in locked position until the respective relay coil is energized.

A trip relay coil, when energized will magnetize its armature thus "tripping" (releasing) the latch assembly to actuate its switches. The switches remain actuated until relay is reset, eliminating the necessity of a lock-in circuit for each relay. When a "clutch trip relay" or relays are included in the assembly, it is possible to reset groups of relays independently from other groups. Each group of relays has its own index cam to insure a complete reset cycle.

The main relay mounting plate may be removed from the trip bank assembly frame by removing the thumb screws from the two end plates of the assembly then raise the back of the relay mounting bracket which swivels on the main shaft and lift off.

1. To replace a trip relay coil, latch assembly or armature:

- (a) Remove the main relay mounting plate (as described above).
- (b) Turn main mounting plate upside down. Note that coils are mounted in group coil brackets 2 or 3 to a group.
- (c) To remove a coil, latch assembly or armature, loosen screws to all coils in a group coil bracket. Remove nuts and lock washers that secure the bracket to main mounting plate.
- (d) Unsolder bare jumper wire on all coils in the bracket.
- (e) Hold down latch assembly and remove the coil bracket from the main mounting plate.
- (f) To replace armature or latch assembly, first remove the spring.
- (g) To replace the center coil of a 3 coil group, either remove an outside coil first, or remove center armature spring and armature.
- (h) When replacing the bracket-coil-armature group back on main mounting plate, hold down latch assemblies and also hold armatures against the coils. When assembly is completed, solder bare jumper wires to coils.



MOTORIZED TRIP RELAY BANK

2. To replace motor or cams:

- (a) Remove main relay mounting plate.
- (b) Remove 2 screws from long rods that secure end plate and motor.
- (c) Pull end plate and motor.
- (d) Remove 4 motor mounting screws. NOTE When installing a new motor, be sure roll pin on new motor shaft is in place.
- (e) To remove cams when no clutch is on the assembly, pull the entire cam shaft assembly from other end plate. Remove "E" retainer ring from end of shaft and cams will slide off. Normally all cams are identical.
- (f) To remove cams when a clutch is included on the assembly, remove cams away from center cam, do not loosen set screws on center cam unless necessary. To remove cams on motor side of center cam, drive out roll pin in shaft. To remove a clutch assembly, drive out roll pin holding clutch assembly.

SWITCH ADJUSTMENT

The switches should be adjusted so that they perform the desired function in both on and off conditions. Some judgement should be exercised, for you want the switch to perform properly, not have a uniform gap setting.

Before adjustments are made, make certain that the screws holding the switch stacks are down tight. The plastic spacers in the switch stacks will occasionally shrink by drying out. This causes a poor adjustment. The switches should be adjusted with a minimum 1/16" gap and at least 1/32" over travel. Do not kink or bend sharply as this will cause the blade to fatigue and lose its ability to spring back. Eventually it may fracture and break. Adjust blades with a sweeping, bowing motion, with a switch blade adjusting tool.

STEP-UP UNIT

Other Names: Stepper Unit, Rotary Switching Unit, Step Switcher Unit, etc.

Types of Units: 1. Continuous Rotation 2. Total Reset
3. Escapement Reset, (single step reset).

Continuous Rotation Units: This unit has only one solenoid which drives the unit in only one direction. The score drum units and 00-90 units are examples of this type of unit.

Total Reset Units: This unit has two solenoids - one to drive (step up) the unit and another to reset the unit to index (zero) position. The ball count unit, player up unit are examples of this type of unit.

Escapement Reset Units: This unit has two solenoids - one to drive (step-up) the unit and another to reset the unit one step (position) at a time. The credit unit and some bonus units, especially those that score over 500 or 5000 points, in increments of 10,000 or 1000, are this type of unit.

Purpose of Step-Up Units: These units serve as a mixer sequence unit (00-90), counter unit (score drum unit), memory sequence unit (bonus units), alternator unit (two-coin unit), sequence unit (player up unit) etc.

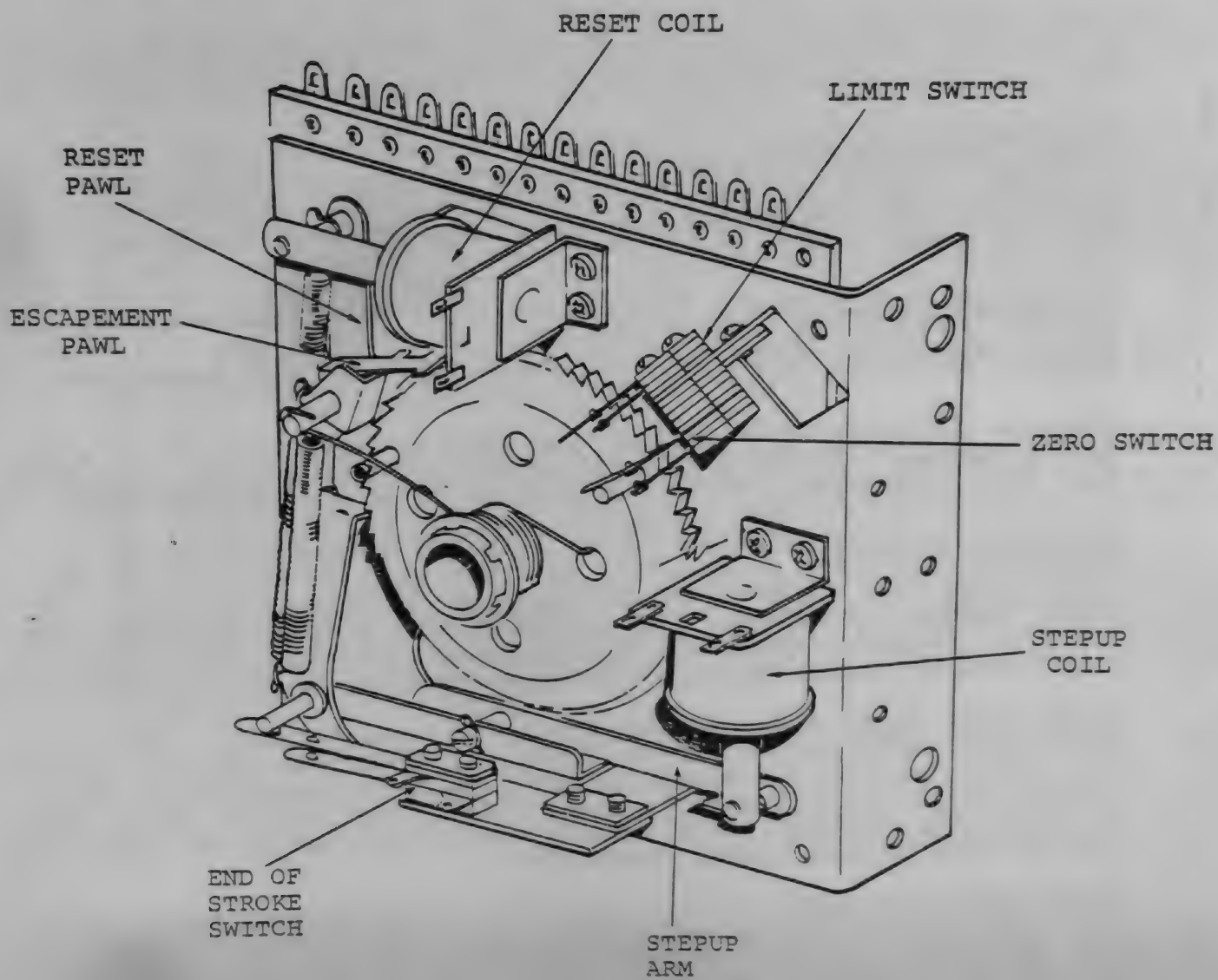
They are switching units in that they make or break circuits in a definite pattern. Actual switching is done by wiper assembly making contact with wired rivets or "printed circuits" on the bakelite disc.

Operation of Units: Step-up (drive) solenoid; when the solenoid is energized, the drive pawl engages the next tooth on the ratchet, release power, and the drive spring advances the ratchet one step. The wiper assembly is attached to the ratchet so the wiper moves from one rivet to the next. The index pawl or reset pawl holds the ratchet in a position until the drive pawl moves the ratchet to the next position.

Total Reset Unit: Step-up operation is the same as above. This unit has a reset solenoid and plunger which when energized operates the reset (index) pawl to dis-engage the drive pawl and mechanically locks itself and drive pawl away from the ratchet. The torsion spring (none on continuous rotation units) is attached to the ratchet to return the ratchet back to index (zero) position.

Escapement Reset Unit: Step-up operation is the same as above. This unit has a reset solenoid and plunger as on the total reset unit. The main difference between the total reset unit and escapement reset unit, is that the escapement reset unit has an escapement pawl and spring, which allows the ratchet to reset only one position each time the reset solenoid is energized. The escapement pawl does not lock in dis-engaged position. To totally reset this unit, it is necessary to pulse the reset solenoid until the unit is in index position.

Wiper Assemblies: Type of wipers - 1. Grounded to frame. 2. Copper disc feed. 3. Insulated. 4. External wire feed.



STEP-UP UNIT

Grounded to Frame Wipers: These wiper blades make contact with metal spacers on the wiper assembly, which in turn are grounded to the unit frame through a wiper finger. The frame is fed by a wire soldered to a solder lug which is screwed to the frame.

Copper Disc Feed Wipers: The feed to these wipers is a copper disc on the wiper assembly, which is fed by a wiper blade that is riveted to the bakelite disc and wired to a solder lug on the disc. These wipers are insulated from the metal spacers by bakelite spacers.

Insulated Wipers: These wipers are generally paired and they are insulated from other blades by bakelite spacers of the wiper assembly. One wiper is fed by a rivet, completing circuit to another wiper and rivet.

External wire feed wipers: This type of wiper can only be used on the reset type of unit. The feed to these wipers is a spring shielded cable mounted on the assembly. One end of each wire is soldered to a solder lug which makes contact with the wiper blade, and the other end is soldered to a solder lug mounted on the disc, or an auxilliary bakelite strip.

Switches: End-of-Stroke Switch: This switch is actuated by the drive arm about the time the drive pawl has engaged the next tooth of the ratchet.

Zero Switch: (Used only on resetting units). This switch is actuated by a pin on the ratchet when the unit is in index position. This switch should be adjusted so that it does not restrict the movement of the ratchet in any way.

Limit Switch: (Used only on resetting units). This switch is actuated by a pin or post on the ratchet when the unit has advanced to its maximum position. This switch should be adjusted so that it does not restrict the movement of the ratchet as the unit advances into the last position.

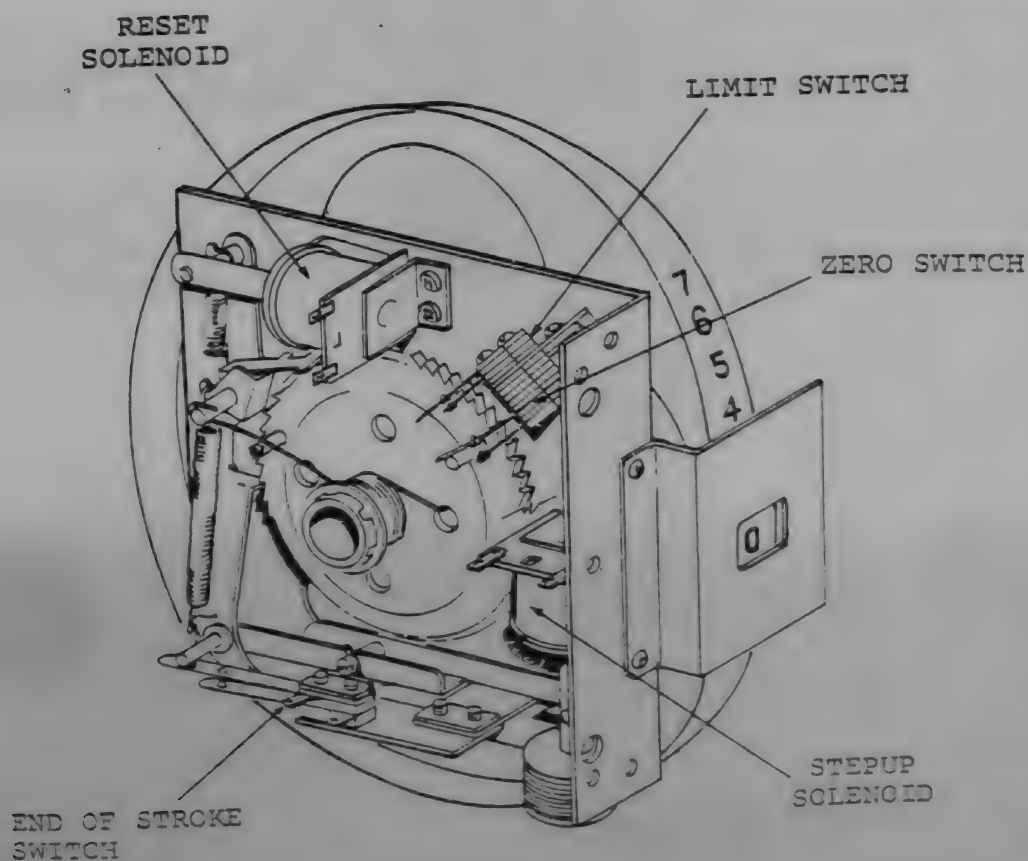
CREDIT OR RELAY UNIT

The credit unit is an escapement reset step-up unit with a numbered reel. The reel indicates the number of credits remaining.

The credit unit is advanced by coins passing thru coin chutes and when credits are earned during play of game (wherever not prohibited by law), twenty-five credits is the maximum limit of credits available, adjustable for lesser amounts.

The credit unit is reset one credit at a time when the credit button is used to set up a game or increase the number of players eligible to play, within limitations of the game.

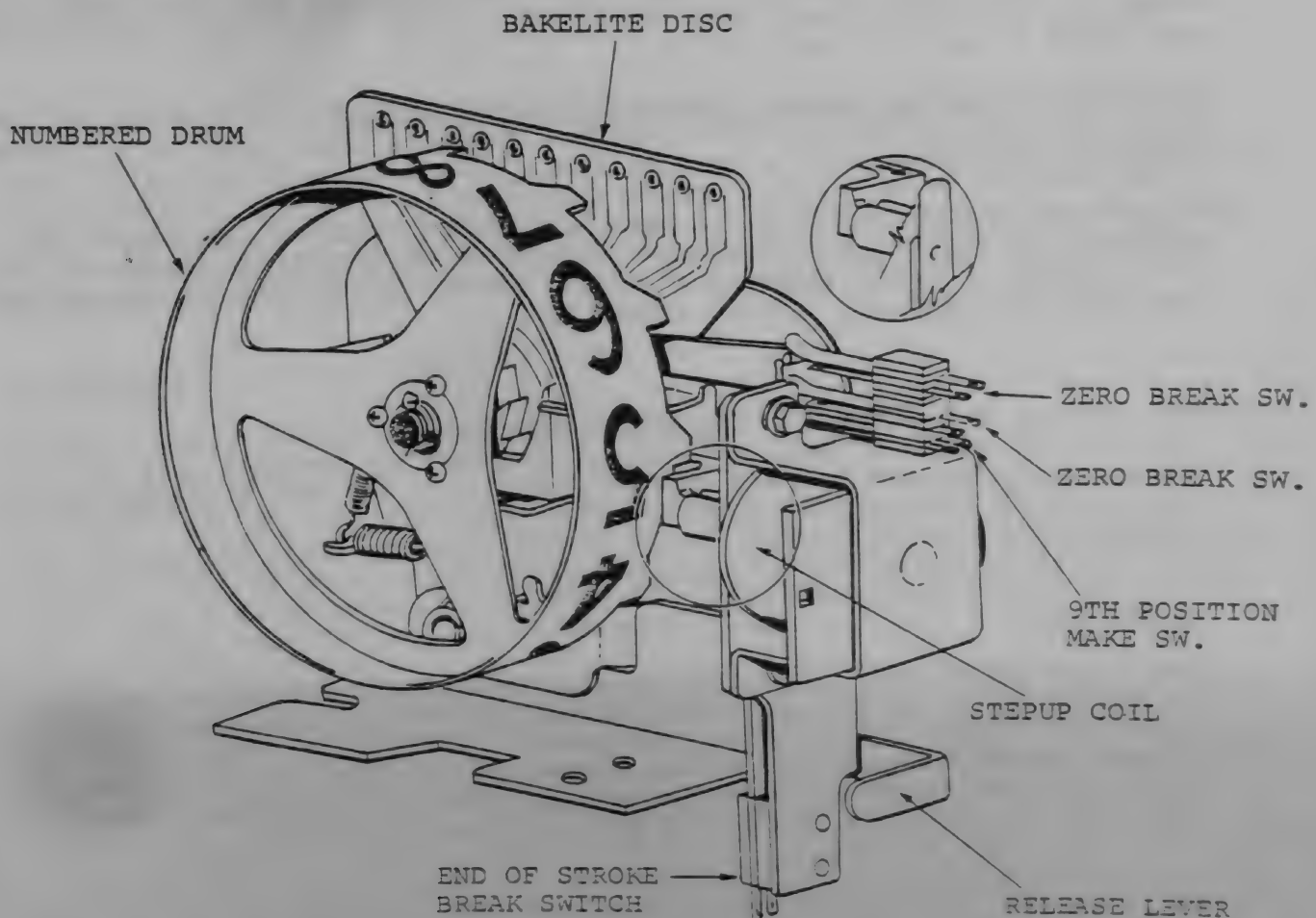
This unit has a zero switch which "opens" when no credits remain. When this switch is "open", it makes the credit button switch inoperative. The unit has a limit switch which "opens" when maximum credits are registered. This switch "opens" the circuit to the step-up solenoid. This unit also has an end-of-stroke switch which operates the sounder (knocker) to indicate audibly when a credit has been added.



SCORE DRUM UNIT

To add and accumulate the players score, a number of drum units are used. These are 10 position, continuous rotation, type of step up units, with an attached plastic drum numbered from 0 to 9. Some drum units also have a 10 position bakelite disc and wiper assembly, for additional circuit applications. A switch that opens at the zero position allows the unit to be "cleared" to zero or index position, for the start of a new game. Another switch that opens at zero allows the reset relay (or start relay) to remain energized to guarantee that all drum units "clear" to zero.

During the course of the play of the game, a ninth position make switch is used so that the unit's next pulse will also advance the adjoining drum unit; for example score of 19 to a score of 20. An end of stroke break switch is used to break the lock-in circuit of the point relay. The lock-in circuit is used to insure a proper advance of the drum unit.



SCORE DRUM UNIT

ROLL-OVER WIRE

Roll-over wire forms serve as levers that when actuated by a ball on the playfield, operate switches mounted beneath the playfield. The wire forms come in various sizes and shapes. They are also designated as right or left roll-over wire forms.

ADJUSTMENT

First, be sure that the wire form is centered in the slot in the playfield. Second, the long blade of the switch should be adjusted to hold the wire form snug to the bottom of the playfield. Too much tension will hang up the ball in play.

Normally open switches: Adjust short blade so there is $1/16$ " gap between contacts. Then place ball on highest point of wire form, there should be approximately $1/32$ " follow thru after contacts are closed. With cabinet leveled, playfield should have a $3\frac{1}{2}$ pitch. Place ball in the rest position so that the ball comes in contact with wire form and playfield at the same time. Release ball, if switch pressure is correct, ball will pass over wire form causing the switch to score. Under no condition should the ball stop on the wire form, since this may cause a coil to burn out.

Normally closed switches: The short blade should be adjusted so that there is a gap of about $1/64$ " between contacts when ball is on highest point of wire form.

To prevent switch vibration a special blade is used. It should be adjusted so it is just barely in contact with the short blade, to act as a damper. For an additional test, the playfield may be jarred with the hand to check for switch vibration.

TARGET SWITCHES

Target switches are mounted on the playfield, and are actuated by the ball hitting the plastic target. They may have two (2) or three (3) blades.

ADJUSTMENT

The front blade (the one in which the plastic target is mounted), should be formed so it is touching the end of the slot in the playfield. Doing this will dampen front blade vibrations. The spacing between contacts should be $1/16$ " and $1/32$ " follow thru. Do not kink or bend sharply as this will cause the blade to fatigue and break. Adjust blades with a sweeping, bowing motion, with a switch adjusting tool.

ROLL-OVER BUTTON (star type)

This roll-over button assembly consists of a plastic insert that acts as a seat for the roll-over button and its stem. As the actuated switch blade is directly on this stem, there is no leverage advantage as in the roll-over wire form type of actuator. Therefore, a careful switch adjustment is necessary.

ADJUSTMENT

The actuated blade is adjusted so as to apply a slight pressure on the button. The short blade is adjusted for a gap of approximately $1/32"$ and a $1/32"$ follow thru.

The anti-vibration blade should be just barely touching the short contact blade.

With the playfield secured in a normal operating position, it is advisable to strike the playfield, to check for vibration of the switch.

It should also be tested by placing a ball at the top edge of the button to check that the ball does not hang up.

ROLL-OVER BUTTON (round button type)

This roll-over button assembly consists of a metal bushing screwed into the bottom of the playfield, and a round white plastic button with a stem. As the actuated switch blade is directly on this stem, there is no leverage advantage as in the roll-over wire form type of actuator. Therefore, a careful switch adjustment is necessary.

ADJUSTMENT

Using a heavy switch bracket adjusting tool or long nose pliers, bend switch stop bracket so that the button is flush with the top of the playfield.

The actuating blade is adjusted so as to apply a slight pressure on the button. The short contact blade is adjusted for a gap of approximately $1/32"$ and a follow thru of $1/32"$. The anti-vibration blade should be just barely touching the short contact blade.

With the playfield secured in a normal operating position, it is advisable to strike the playfield, to check for vibration of the switch.

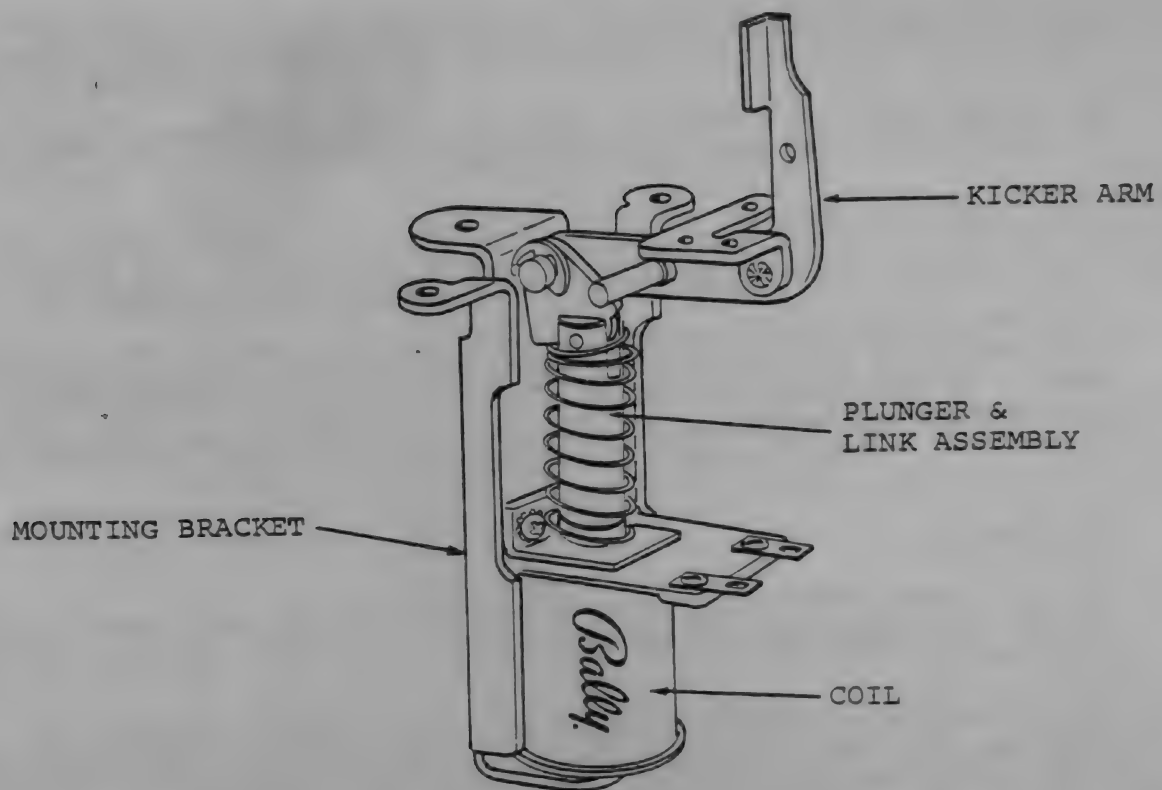
It should also be tested by placing a ball at the top edge of the button to check that the ball does not hang up or fail to score.

SLING-SHOT

The sling-shot is a solenoid operated kicker, that is usually located near the bottom of the playfield. The solenoid is energized by the ball hitting the rubber ring which in turn actuates the switch.

ADJUSTMENT

When sling-shot kicker is at rest, actuating blade of switch should just barely touch the rubber ring, with 1/16" gap between switch points.



RUBBER REBOUND SWITCH

Adjustment: Adjust the switch the same as for the sling-shot.

MUSHROOM BUMPER

Mushroom bumpers consist of a plastic cap with a stem, which directly actuates the switch. The spring loaded cap is housed in a post, which is fastened to the playfield. When a ball comes in contact with the cap, it is raised up, allowing the switch to close.

ADJUSTMENT

The short contact blade is adjusted for a gap of $1/32$ " when the plastic cap is in the normal position. (push cap down to make sure it is in the normal position).

Lift the plastic cap by hand, and adjust the long contact blade for a good solid contact with the short blade.

Be sure that the plastic cap returns to its normal position.

With the playfield secured in the normal operating position, it is advisable to strike the playfield, to check for vibration of the switch.

BUMPER TARGET

A bumper target is a plastic assembly that will cause a ball to rebound and register a score. When a ball rolls on the plastic disc, the attached stem actuates a cup-shaped switch beneath the playfield.

ADJUSTMENT

Make sure that the stem is in the center of the cup of the switch.

The bumper contact switch should be adjusted with a gap of $1/32$ " and a follow-thru of $1/32$ ".

THUMPER BUMPER (AC type)

A thumper bumper is an illuminated plastic assembly with a metal and a plastic disc around its body. When a ball rolls on the plastic disc, the attached stem actuates a cup-shaped switch beneath the playfield. This switch energizes a thumper bumper relay which is held energized by its own lock-in switch and the normally closed thumper bumper solenoid end-of-stroke switch. Another switch on the thumper bumper relay, when energized will energize the thumper bumper solenoid which in turn pulls the metal ring down, kicking the ball away from the thumper bumper.

The purpose of the thumper bumper relay is to insure a full stroke of the thumper bumper solenoid, and a third switch on the relay activates the scoring.

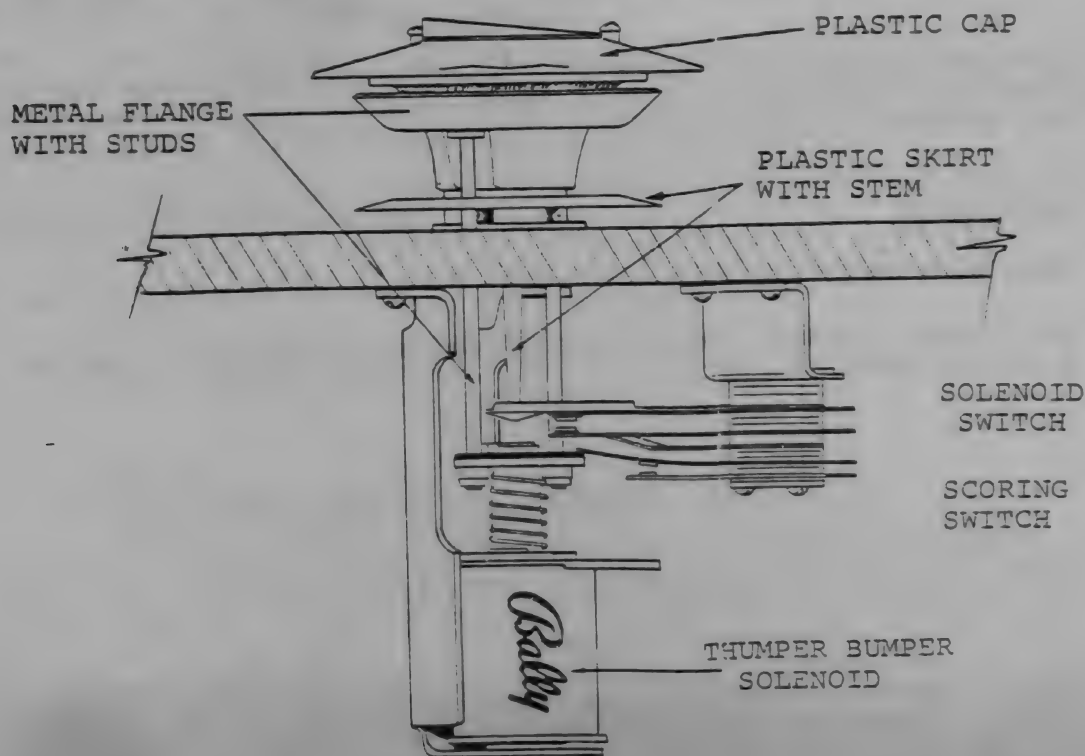
ADJUSTMENT

The thumper bumper solenoid end-of-stroke should be adjusted to have a minimum of $1/32$ " follow thru when plunger is pulled down. In any case, the switch must open when the plunger is pulled all the way down, otherwise the thumper bumper relay switch will keep the thumper bumper solenoid energized.

The bumper contact switch should be adjusted with a gap of $1/32$ " and a follow thru of $1/32$ ". To insure best bumper action, the stem attached to the plastic disc should be centered in the cup of the switch. This also insures that the stem will not lock the switch closed. Lo-torque instrument grease should always be in the cup of the switch. (available at your Bally distributors, however, never use vaseline). This will prevent excessive wear of stem and cup.

THUMPER BUMPER (DC type)

The DC (direct current) type thumper bumper is very similar to the AC (alternating current) type, except that it is operated directly by its own contacts, therefore, no relay is used.



THUMPER BUMPER (D.C. TYPE)

ADJUSTMENT

The bumper contact switch should be adjusted with a gap of $1/32$ " and a follow thru of $1/32$ ".

The other switch is the scoring switch, which should have a gap of $1/16$ " when the bumper is in the normal position.

ADJUSTMENT (continued)

To insure best bumper action, the stem attached to the plastic disc should be centered in the cup of the switch. This also insures that the stem will not lock the switch closed. The DC type thumper bumper does not need lubrication in the cup of the switch, because the cup is made of self lubricating plastic.

FLIPPERS

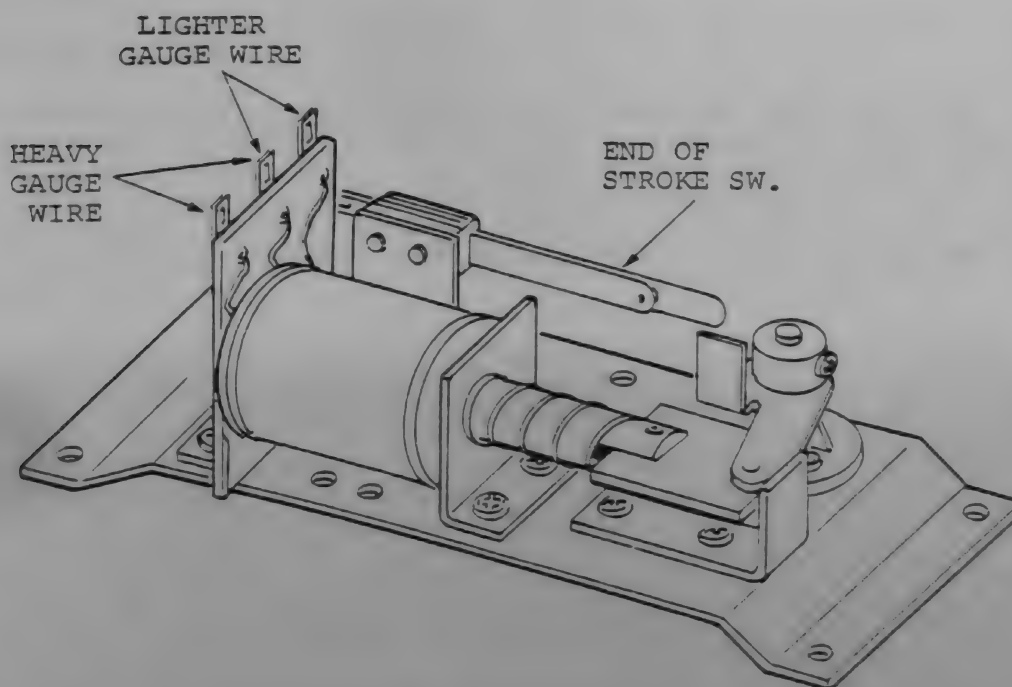
A flipper is an electrically driven bat-type device. A push button on each side of the cabinet allows the player to bat the ball with an element of skill.

The flipper solenoid is a double wound coil. The pull-in winding is a strong winding, constructed of a heavy gauge wire, to insure a fast pull-in. The hold-in winding is a weaker winding, constructed of a lighter gauge wire. When the plunger is pulled-in, a solenoid end-of-stroke switch is opened to cause the circuit to go thru both windings, thus preventing a solenoid burn out when the flipper button is held in.

ADJUSTMENT

The solenoid end-of-stroke switch should be adjusted so that when the plunger is completely depressed manually, the short blade should be adjusted for a gap of $3/32$ " and a follow thru of $1/32$ ".

The only lubrication required on the flipper unit is the linkage.
DO NOT LUBRICATE PLUNGER.



CLOSE FLIPPER or ZIPPER FLIPPER ASSEMBLY

The close flipper assembly moves the flipper assemblies together to stop the ball from going into the outhole, thereby allowing the player added playing time. Basically this assembly consists of a solenoid to move the flipper assemblies together, a switch assembly to lock-in-the circuit until the solenoid has mechanically latched the assembly in the closed position and a release coil to unlatch the spring loaded linkage to move the flippers back to their normal positions.

ADJUSTMENT

The solenoid end-of-stroke switch should be adjusted so when the plunger is completely depressed manually, the short blade should be adjusted for a gap of $3/32$ " and a follow thru of $1/32$ ". The only lubrication required on the flipper unit is the linkage.

DO NOT LUBRICATE PLUNGER.

3 BALLS IN PLAY GAMES

3 Balls-in-play games have proved very popular. It involves ball or balls held captive on the playfield until another ball performs a certain function to release the captive ball or balls thus it is possible to have 3 balls in motion on the playfield at one time.

A game of this type requires some special equipment and consequently special circuits to operate them. First of all, the game must be able to establish the position or location of each ball. When a ball becomes captive and the other two balls are out of play, a ball must be released to the shooter alley so that the same player may continue to play. The game must be able to determine when a play is completed so that the next player may play, or in case there is only one player, the game must advance the ball count unit.

BALL TROUGH ASSEMBLY FOR 3 BALL GAME

This assembly has three trough switches to indicate when there are 3 balls in the trough. When there are 3 balls in the trough, the ball release relay is energized which in turn energizes the ball release solenoid to release one ball, except when the game is over. When there is a captive ball on the playfield, the captive ball switch takes the place of the 3rd trough switch, and when there is a 2nd captive ball on the playfield, the 2nd captive ball switch takes the place of the 2nd trough switch. The ball trough switches must be adjusted so that the ball rolling down the trough will not make two switches at one time. The switches must not be adjusted so tight as to hold back a ball, no matter how slowly the ball rolls.

Spring loaded ball retainer pawls (3) on the side of the ball trough prevents a fast ball from bouncing back in the trough, causing the game to mal-function, such as failing to deliver a ball or delivering an extra ball.

BALL RELEASE ASSEMBLY

This assembly is used only in a 3 ball game and operates only when the 3rd ball is out of play, at which time it releases a ball from the ball trough except on game over. The first ball in the trough should stop inside notch of release cam. The cam is positioned by 2 set screws. After adjustment, push in plunger manually, the ball should kick out before the plunger bottoms. After adjustment, the set screws must be screwed in tight.

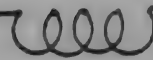
CAPTIVE BALL ESCAPEMENT ASSEMBLY

The captive ball escapement assembly was designed and patented by Bally. It is mounted under the playfield with escapement pawls extended thru the playfield in such a manner that the ball in the captive ball alley will advance one position at a time. The escapement pawls are hinged on a single bar which is attached to a plunger. A solenoid when energized pulls the plunger allowing the captive ball to advance to the next position and eventually to leave the captive alley.

BASIC CIRCUITS

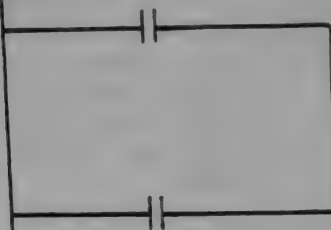
ROLL OVER SW.or TARGET

RELAY



EXAMPLE #1

This is the very simplest method of energizing a relay. The relay is pulled in only as long as the switch is closed.



RELAY



EXAMPLE #2

The operation of example 2 is identical with example 1 except that either switch will pull in the relay.



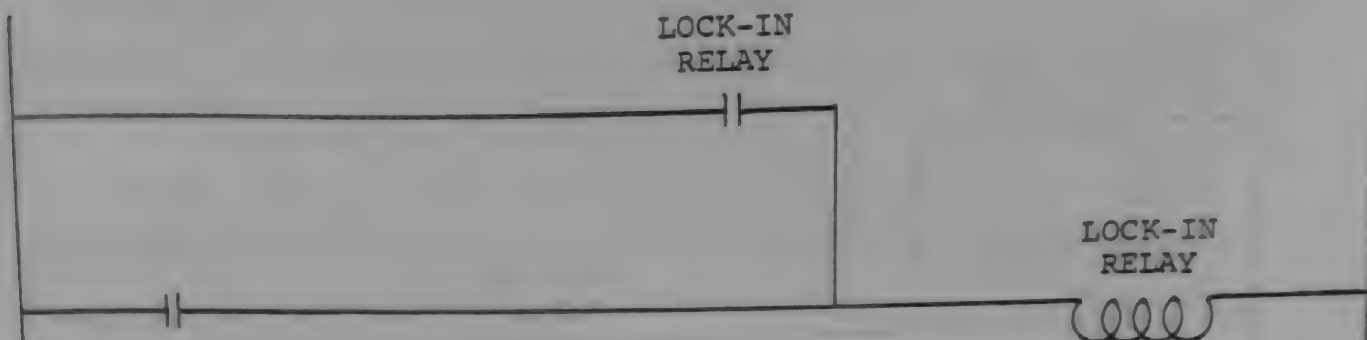
LOCK-IN
RELAY

RELAY



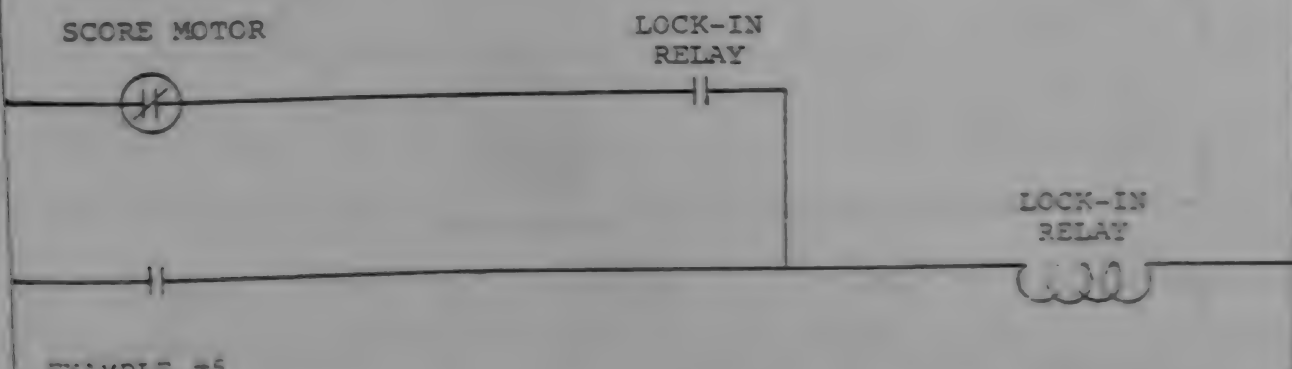
EXAMPLE #3

The only difference with example 3 from 2 is that the hold relay switch must be closed to complete the circuit.



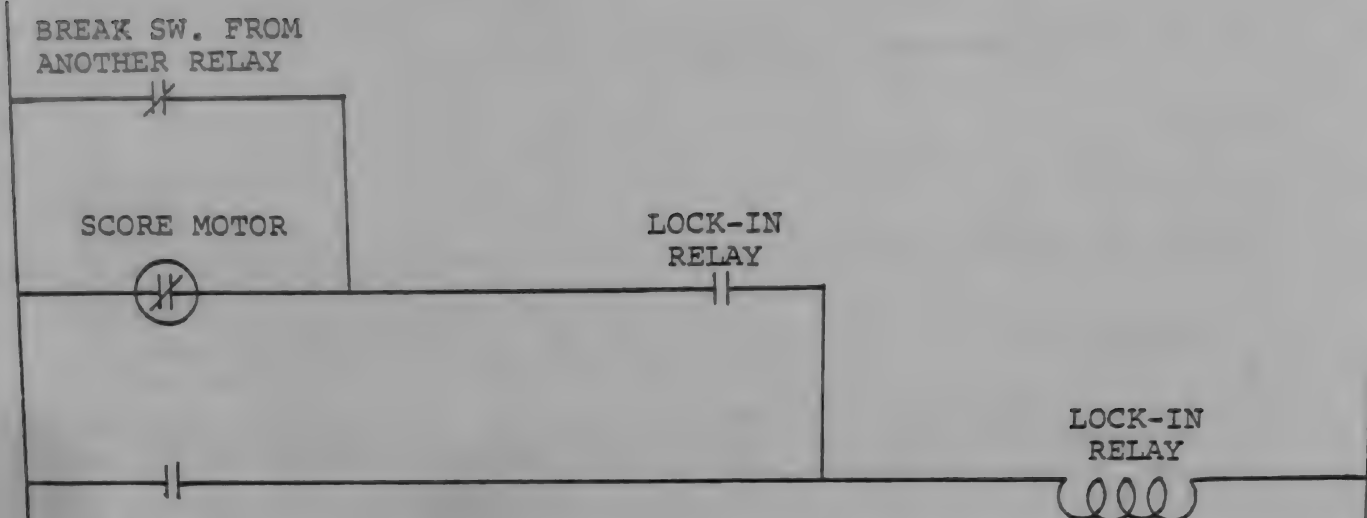
EXAMPLE #4

This is the basic form of a lock-in or hold relay. Once the relay is energized, the only way to de-energize it would be to remove the voltage source.



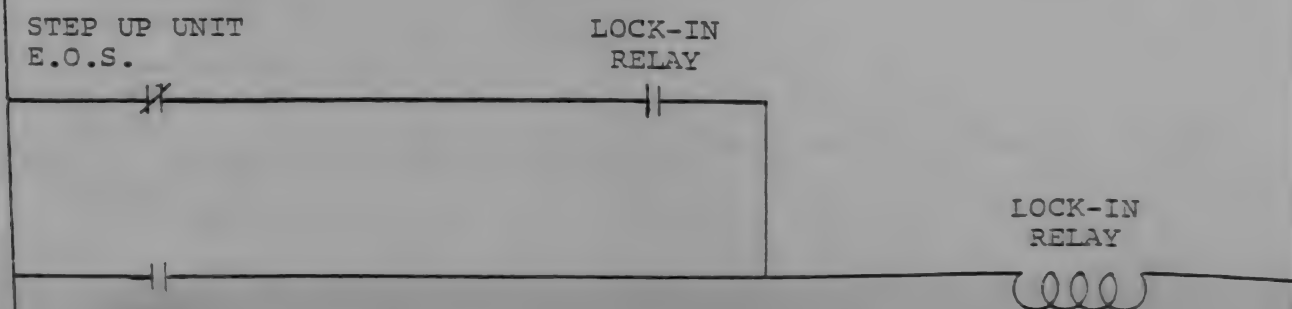
EXAMPLE #5

This lock in circuit will drop out when ever the score motor turns. The score motor switch is usually a #8 or #10 cam switch.



EXAMPLE #6

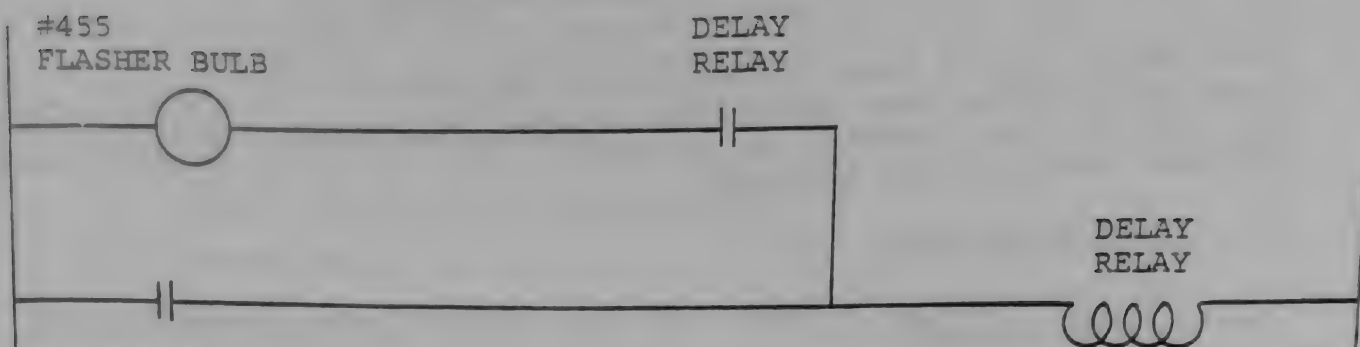
In this circuit the relay will not drop out with each score motor index. The drop out can be delayed because of the other switch in parallel with the score motor switch. The break switch from the other relay must open before and remain open until after the score motor impulse.



EXAMPLE #7

The relay is locked in through a step up unit end of stroke switch. The step up unit must advance for the relay to drop out. A typical example of this circuit is in the point relay (10,100,1000) lock in circuits.

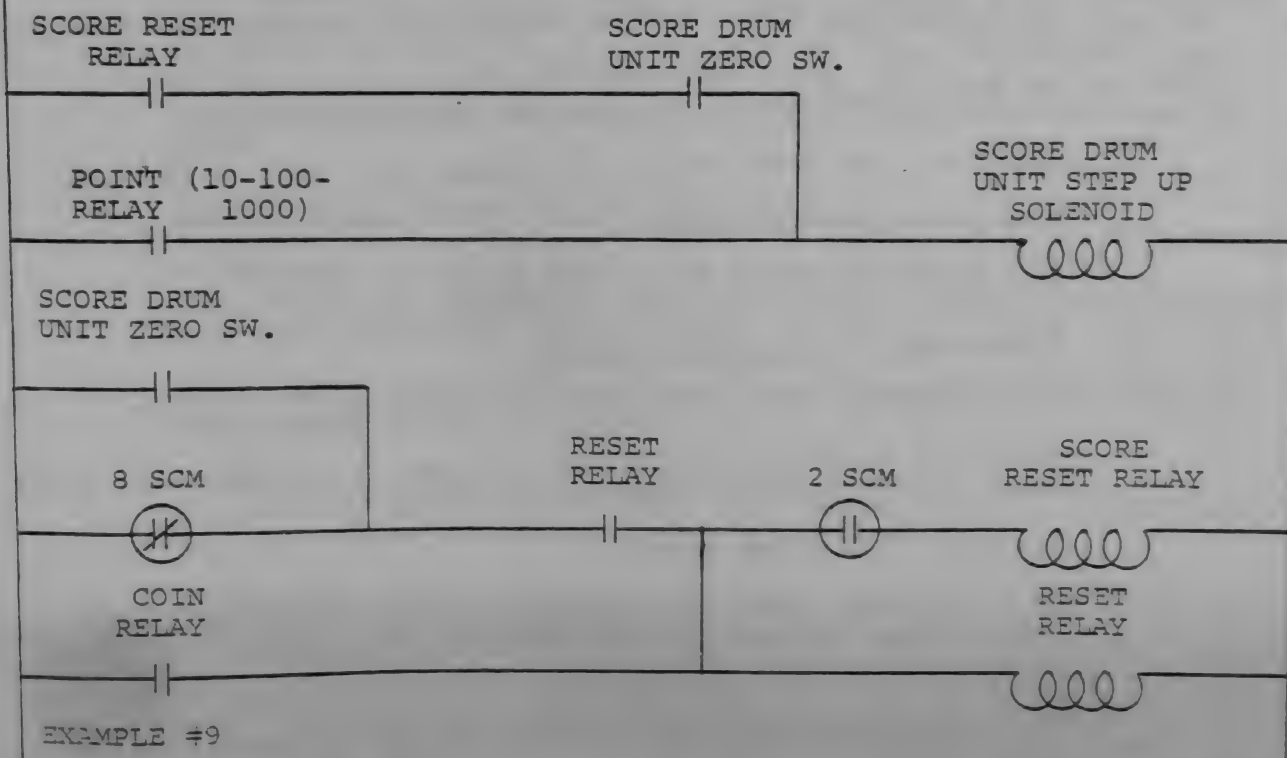
T



EXAMPLE #8

The delay relay circuit used in Bally games are actuated by the slam switches located on the front door cabinet left side, and on the mounting or bottom board.

When the game is abused, the weighted switches pull in the delay relay. The relay is locked in by the filament of the flasher lamp. As the filament of the lamp heats up, the internal bimetal contacts open the lamp circuit causing the relay to drop out.



EXAMPLE #9

When the coin relay switch is closed, the reset relay is pulled in starting the score motor. The reset relay will stay locked in until all the score drum units advance to zero, and when #8 score motor cam switch is actuated. As long as the reset relay is energized, the score reset relay will pulse thru #2 score motor cam. During the game reset time the score drum units will advance until the score drum units zero switch opens.

INTRODUCTION TO SERVICING

More damage can be done by unnecessary adjustments and probing before first considering what could have caused the trouble. Most operations are more or less standard on all games. The sequence of operations are also more or less standard.

(1) Start of a game:

- (a) At start of a game, the coin (start) relay must first be energized.

(b) Functions of the coin relay:

Operates the score motor

Energizes the reset relay, which in turn causes the score reset relay(s) to pulse thru the #2 and/or #11 score motor cam switches to reset the score drum units.

Resets the ball count unit.

Resets the credit unit, if credit was used to start the game.

Latches the game over relay.

On a 4-player game, resets the player up unit and the coin unit.

On a 2-player game, latches the 2nd coin relay.

Operates the reset motor, if there is a trip relay bank.

Energizes the lock relay.

May reset features units, if any.

(c) Functions of the reset relay:

Will energize only at the start of a game.

The main function of the reset relay is to reset the score drum units thru the score reset relay(s).

Operates the score motor.

On a 4-player game, in conjunction with the coin relay resets the player up unit and controls the coin unit step up or reset of the unit.

On a 2-player game, it controls the latch or trip of the 2nd coin relay.

While the reset relay is energized, it prevents the features relays and scoring relays from operating.

May reset features not reset by the coin relay.

- (d) There may be other feature relays or units that are special features of that particular game.

(2) During the play of a game:

(a) Functions of the outhole relay:

Operates the score motor

Advances the ball count unit after a ball has been played and no extra ball has been earned, except in a 4-player game it will advance the player up unit until the last eligible player has played at which time it will advance the ball count unit and reset the player up unit.

Resets feature units, except hold-over features.

Completes circuit to operate the outhole kicker solenoid.

While energized, will drop out the tilt relay on all 2 and 4 player games, also adjustable on some one player games.

(b) Functions of the outhole relay on a 2 or 3 ball game:

The functions are the same as above, except this relay does not advance the ball count unit or the player up unit or drop out the tilt relay. Instead of these functions, the outhole relay controls the circuit to the 2nd or 3rd ball relay and the ball release relay when all balls are out of play.

(c) Functions of a 2nd or 3rd ball relay:

A 2nd ball relay is used on a 2 ball game.

This relay is energized when the outhole relay is energized and both balls are out of play.

This relay when energized indicates the end of the play for the player up on that ball.

A 3rd ball relay is used on a 3 ball game.

This relay is energized when the outhole relay is energized and all three balls are out of play.

This relay when energized indicates the end of the play for the player up on that ball.

When both the ball release relay and the 2nd or 3rd ball relay are energized, they complete the circuit to advance the player up unit or advance the ball count unit and reset the player up unit.

(d) Functions of ball release relay:

This relay is energized when both of the balls are out of play in a 2 ball game, or when all 3 balls are out of play on a 3 ball game.

When the outhole relay and the 2nd or 3rd ball relay are energized then the outhole relay drops out, the ball release relay is energized.

If the outhole relay is not energized, only the ball release relay will operate.

Advance the ball count unit or the player up unit if both the ball release relay and the 2nd or 3rd ball relay are energized.

Operates the score motor

Energizes the ball release solenoid thru the normally open #4 score motor cam switch.

- (e) The ball count unit will advance only when the ball index relay is energized; if the extra ball relay is not energized.

On some 1-player games, the ball count unit is advanced at the start of the game and the unit is reset one position at a time at the end of each play. The unit will advance one position whenever an extra ball is earned up to and including 9 balls to play.

When the score glass reads "balls to play", the ball count unit resets one position at the end of each play.

When the score glass reads "ball in play", the ball count unit advances one position at the end of each play.

On a 4-player game, the ball count unit does not advance until the last eligible player has played. This is determined by the player up unit in conjunction with the coin unit.

(3) Completion of a game:

- (a) The game over relay is tripped when the adjusted number of balls have been played thru the ball count unit disc. The game may be adjusted for either 3 balls per game or 5 balls per game not counting the extra balls scored.
- (b) The game over relay is tripped when the power to the game is cut off even momentarily, thru the lock relay switch.
- (c) On most 1 player games, if the game is tilted the game over relay is tripped. On some 1 player games, it is adjustable to trip the game over relay or stop the action of the ball in play.

(4) Functions of the 2nd and 3rd coin chute relays:

- (a) The main function of these relays is to add credits to the credit unit for coin played, the number of credits is determined by the adjustments on the 3rd coin chute adjustment plug.
- (b) These relays do not reset the game. To reset the game, it is necessary to press the credit button on the front door.
- (c) These relays should operate the score motor. If either relay is energized but the score motor does not operate check the following:

The score motor terminal plug should be plugged in.

The coin chute switch wire form should be in top position of curved slot.

Turn score motor cam manually, it may be jammed.

Check switch adjustment of relay which is energized, especially the switch with a red-yellow wire.

TROUBLE-SHOOTING HINTS

Coins Rejected:

1. (a) Visually check the coin lock-out coil on the front door. It should be energized with the armature flap touching the coil core. If not energized, check following:
 - (b) Checks for power supply to the game:
Check with a meter or test probe from yellow wire to black wire for 50 volts.

If no meter or test probe is available, press left flipper button. The display lites should lite. (Not on later models)
 - (c) Causes of power supply failure:
Power line "on-off" toggle switch may be turned "off" (switch is located on bottom of cabinet).

Power line fuse may be burned out or not making good contact with fuse holder. Unplug game before checking. (the fuse is located by the transformer, in early models).

Line cord may be broken.

Power failure to line cord.

50 volt fuse may be burned out or not making good contact with fuse holder. This fuse has red-white wire and black wire.

- (d) Power supply is okay: and coin lock-out is not energized, check following:

Score motor terminal plug should be plugged in.

#1 score motor cam switch with yellow wire and gray-red wire should be making.

Cable connector from cabinet to mounting panel properly plugged.

Check for 50 volts at coin lock-out terminals.

The coin may be defective.

Coin lockout bar may be jammed or binding.

2. If coin lock-out is energized and the coins are rejected clean out the coin acceptor mechanism. There may be some foreign matter slowing down or deflecting the coin.

Score Motor

1. Score motor runs continuously at start of game, check following, in order listed below:

- (a) If credit relay is energized, check adjustment of credit button switch and #7 score motor switch with brown-red wire and green yellow wire. Also check adjustment of credit relay switch with green-yellow wire and brown-red wire.
- (b) If coin relay is energized, check adjustment of 1st coin chute switch and #8 score motor switch with brown-red wire and blue-white wire. Also check adjustment of coin relay switch and credit relay switch with blue-white wire. Also check adjustment of coin relay switch and credit relay switch with blue-white wire and gray wire.
If 2nd coin chute adjustment plug is adjusted, for one play from 2nd coin chute, check adjustment of that switch.
- (c) If 2nd or 3rd coin chute relay is energized, check the switch adjustment of the respective coin chute. The wire from that actuates the switch may have come out of the slot. It is best to remove the coin acceptor mechanism for better viewing. Also check the 3rd coin chute adjustment plug. If 2nd coin chute relay remains energized unplug the plug with a brown-white wire; if it is the 3rd coin chute relay, unplug the one with the orange-white wire. If this corrects the problem, check the score motor cam switch involved and the coin chute relay switch that locks in the relay. (the switch with a jumper wire to the relay coil).

- (d) If the reset relay is energized, this relay is pulled in by the coin relay. Once energized it is held energized by all score drum units zero switches, as well as by #8 score motor cam switch with yellow wire and green-black wire. If any one of these switches does not open, the reset relay will remain energized. The top zero switch locks-in the reset relay. The switch below it, completes the circuit to pulse the solenoid until the unit reads "0".
2. Score motor runs continuously, during play of a game:
- (a) Check the adjustment of the #1 score motor cam switch with a yellow wire and red-yellow wire. This switch should open at index position of the score motor unit.
- (b) If there is a ball in the outhole and the ball does not kick out, check the outhole kicker circuit on the schematic. The pulse that operates the outhole kicker solenoid is generally on cam 7 or cam 4. Check adjustment of switches on these cams. It is also possible that the outhole kicker solenoid is defective.
3. Score motor does not run:
- (a) Check the score motor terminal lug. The wire may be unplugged.
- (b) If the 3rd coin chute relay is energized, generally there is something holding the 3rd coin chute switch in a down position. To check, remove the 3rd coin acceptor mechanism. On some games, it is also necessary to check the 2nd coin chute.

Game Over Relay

1. This relay is generally an interlock relay, which is operated by a trip coil and a latch coil, the trip coil is the assembly that releases the switch actuator, and the latch coil is the assembly that sets-up the switch actuator. On some games, the game over trip relay is located on the trip bank assembly.
2. The trip circuit is explained under heading introduction to servicing sub-heading completion of a game.
3. If the game over relay fails to trip:
- (a) When game is completed:
Check adjustment of wiper fingers on ball count unit disc.
- Check the rivets on the ball count unit disc, they may be dirty, clean the disc using a mild abrasive. Check wiper tension, it should be about 1 ounce pressure, check the balls per game. See that it is in the proper position.
- The ball count unit should reset at the start of each game. On some 1 player games with score glass marked ball in play, the ball count unit will advance two steps for 1 balls per game, or four steps for 5 balls per game.

- (b) If power is temporarily interrupted, check lock relay, it should be de-energized. Also check switch adjustment of normally closed lock relay switch with yellow wire and green-red wire.
- (c) At the start of a game, the game over relay should trip, if the ball count unit had been advanced.

Check the ball count unit zero switch with yellow wire and gray-white wire. This switch should close when the ball count unit advances one position.

On a 4-player game, also check the zero switch on the player up unit with the same wire colors. This switch should close when the unit advances one position.

Credit Unit (also see under heading Step-up Units)

- (1) This unit records the number of plays available with the credit button.
- (2) Credits are increased (up to and including 25 credits) by:
 - (a) 2nd or 3rd coin chute relay when energized.
 - (b) When a game is adjusted to award a credit when a pre-adjusted score is registered.
 - (c) When number match is registered at the end of a game (when so adjusted).
 - (d) Special feature award (not on all games) is earned and adjusted to award a credit.
- (3) Credit is deducted when the credit button is used to start a game or to make additional players eligible to play.
 - (a) Credit is not deducted when a coin is used to energize the coin relay.
 - (b) The credit button when pressed (with a credit shown) will energize the credit relay; which in turn will energize the coin relay.

The credit relay when energized must remain energized thru its own lock-in switch, in series with the normally closed #7 score motor cam switch, in order to deduct a credit.

Score Drum Units

- (1) Reset at start of a game:
 - (a) These units are reset by pulses from the score reset relay(s) that step the units to zero positions. When a unit reads "0" the zero switch on the unit should open (2nd switch from top) to stop the unit from advancing.
 - (b) When the reset relay is energized, it will remain energized by its own lock-in switch, in series with the zero switches of all the score drum units.

If any one of the zero switches (top switch) is closed, the reset relay will remain energized. The reset relay is also held energized by the #8 score motor with yellow wire and green-black wire.

- (c) The score reset relay (s) is fed by the same circuit that holds the reset relay energized the pulses come from #2 and/or #11 score motor switches.

(2) Advance during play of game

- (a) one units score is a dummy reel and does not advance.
- (b) 10-90, 100-900 and 1000-9000 score units are advanced by their respective 10 point, 100 point and 1000 point relays.
- (c) 10,000-90,000 units are advanced by the 1000 point relay switch in series with the 9th position switch on the 1000-9000 unit (bottom switch). The 9th position switch should close when the units reads "9".
- (d) When the 10-90 score drum reads "9" and 10 points are scored, the 10 point relay is energized which will advance the 10-90 score drum unit to zero and at the same time will energize the 100 point relay thru the 9th position switch (bottom switch) on the 10-90 score drum unit.
- (e) Scores from 100-900 score drum unit is transferred to the 1000-9000 score drum unit in the same manner as described under (d).
- (f) In a 2 player game, the above circuit also involves the ball count unit disc to separate the 9th position switches of 1st and 2nd players.
- (g) In a 4 player game, the above circuit involves the player up unit disc to separate the 9th position switches of various players.
- (h) There is an end-of-stroke switch on 10-90, 100-900 and 1000-9000 score drum units (on bottom of units), which holds the respective 10,000 or 1000 point relay energized until the respective unit drive arm has engaged the next tooth on the ratchet. The unit is advanced by a spring when the solenoid is de-energized. The end-of-stroke switch must open when the drive arm has 1/32" travel to engage the next tooth of the ratchet.

Thumper Bumper

If the thumper bumper skirt (plastic ring with post that goes thru the hole in the playfield) gets stuck, it can be due to two things:

- (a) The post on the skirt is not centered in the cup of the switch blade. To correct this, the switch mounting bracket may have to be moved.

- (b) There may be too much switch tension on the tip of the skirt post.
- (c) Clean out the cup on the switch blade and apply a very small amount of coin machine grease in the cup. (on metal cup only).

Post

There are two models of the post assemblies:

- (a) Old model - has only a solenoid.
- (b) New model has a solenoid and a latch coil. On the old model, the solenoid should be de-energized at the end of a game.

On the new model, the solenoid should de-energize when the post is latched in down position.

If it remains energized, check the adjustment of the end-of-stroke switches. The switches should be adjusted in the latched position. Don't hold down plunger while adjusting switches. The over-travel of the plunger in relation to latch position is about 1/32". This is adjustable by moving the latch coil assembly.

Game does not score

- (1) Check 50 volt fuse.
- (2) Check cable plugs.
- (3) Check adjustment of following normally closed switches:

Game over relay switch with black wire and yellow-black wire.
Reset relay switch with yellow-black wire and red-white wire.
Tilt relay switch with red-white wire and red wire.

- (4) Check 10 point, 100 point and 1000 point relays to see if any of them are energized. Check following if a relay is locked in:

Playfield panel switches, that energize the relay. Switches should be open. Check lug end of switch, see that there is no strand of wire shorting switch, or a piece of conducting material.

- (5) Check game over and tilt relays - one or both may be tripped.

Relays

- (1) Cleaning Contacts:
Only use burnishing tool. Don't use a contact file, the contacts are silver.
- (2) Switch adjustment:
Adjustments should be made with a stroking action. Sharp bends fracture the blade.

- (3) Buzzing relays:
Buzzing is generally caused by the armature not being able to properly seat on the coil core.

Causes of buzzing:

Too much back tension on switch blades.

Too low voltage to the transformer.

Burr or foreign substance on the coil core relay frame bent out of shape.

Armature bent.

Step-Up Units

Step up unit solenoids do not advance the units, they pull the drive arm to engage the next tooth on the ratchet. When the solenoid is de-energized, the spring on the drive arm advances the unit to the next position.

- (1) Sluggish units:

To check, non-resetting units:

Raise the drive (step up) pawl and index pawl from the ratchet (see parts catalog, page 113).

Rotate wiper assembly, it should turn freely.

To check, resetting units:

Manually reset unit, then rotate wiper assembly; it should turn freely.

To check, escapement reset units:

(see parts catalog, page 146). Hold down reset plunger and raise escapement pawl away from ratchet.

Rotate wiper assembly or on replay counter unit, rotate the drum they should turn freely.

- (2) Causes of Sluggishness:

Units with disc and wiper assembly. Disc may be dirty, residue of old grease or oil.

Resetting unit with a zero switch should be able to reset when unit has advanced only one step.

Too much tension of zero switch against ratchet pin may hold ratchet from a complete reset.

Resetting unit with a limit switch when manually turned past the limit position may hang up on the limit switch, thus prevents unit from resetting to zero position.

#1014 FLICKER

INSTALLATION AND GENERAL GAME OPERATION INSTRUCTIONS

INSTALLATION

ON ALL GAMES THERE ARE CERTAIN ITEMS THAT SHOULD BE CHECKED AFTER SHIPMENT. THESE ARE VISUAL INSPECTIONS WHICH MAY AVOID TIME CONSUMING SERVICE WORK LATER. MINOR TROUBLES CAUSED BY ABUSIVE HANDLING IN SHIPMENT ARE UNAVOIDABLE. CABLE PLUGS AND SOCKETS MAY BE LOOSENEED, SWITCHES (ESPECIALLY TILT SWITCHES) MAY GO OUT OF ADJUSTMENT. PLUMB BOB TILT SWITCH SHOULD ALWAYS BE ADJUSTED AFTER GAME IS SET ON LOCATION AND LEG LEVELERS ARE ADJUSTED.

VISUAL INSPECTIONS BEFORE PLUGGING IN LINE CORD: -

1. CHECK THAT ALL CABLE PLUGS ARE FIRMLY SEATED IN PROPER SOCKETS.
2. CHECK THAT CABLES ARE CLEAR OF ALL MOVING PARTS AND RELAYS.
3. CHECK FOR ANY WIRES THAT MAY HAVE BECOME DISCONNECTED.
4. CHECK SWITCHES FOR LOOSE SOLDER OR OTHER FOREIGN MATERIAL THAT MAY HAVE COME LOOSE IN SHIPMENT AND COULD CAUSE SHORTING OF CONTACTS.
5. CHECK WIRES ON RELAY COILS FOR PROPER SOLDERING, ESPECIALLY THE BARE (COMMON) WIRE CONNECTING A ROW OF RELAY COILS. COLD SOLDER CONNECTIONS MAY NOT SHOW UP IN FACTORY INSPECTION, BUT VIBRATION IN SHIPMENT MAY BREAK CONTACT.
6. CHECK THAT FUSES ARE FIRMLY SEATED AND MAKING GOOD CONTACT.
7. CHECK (MANUALLY) THE STEPPING AND RESETTING OF ALL STEP-UP UNITS. THE WIPER ACTION SHOULD NOT BE SLUGGISH.
8. CHECK TRANSFORMER FOR ANY FOREIGN MATERIAL SHORTING ACROSS WIRING LUGS.
9. CHECK WIRING OF TRANSFORMER TO CORRESPOND TO LOCATION VOLTAGE. (TRANSFORMER WIRING CARD IN FRONT CABINET).

BEFORE LINE CORD IS PLUGGED IN: -

CHECK ALL PLUG AND SOCKETS AND DRESS CABLES:

- (A) PLUGS IN CORRECT SOCKETS.
- (B) PLUGS SECURELY SEATED IN SOCKETS.
- (C) DRESS CABLES AWAY FROM RELAYS.

CHECK ADJUSTMENT OF THE THREE (NORMALLY OPEN) TILT SWITCHES:

- (A) PANEL TILT ON BOTTOM OF PLAYFIELD PANEL.
- (B) PLUMB-BOB TILT ON LEFT SIDE OF CABINET NEAR FRONT DOOR.
- (C) BALL TILT ABOVE PLUMB-BOB TILT.
INSERT THE BALL (15/16" DIA.) INTO BALL TILT ASSEMBLY AND ADJUST BRACKET SO BALL WILL ROLL FREELY IF FRONT OF CABINET IS RAISED.

CHECK ADJUSTMENT OF THE KICK-OFF AND SLAM SWITCHES:
CHECK ADJUSTMENT OF THE (NORMALLY OPEN) KICK-OFF SWITCH AT REAR OF CABINET MOUNTING BOARD, NEAR CABLE PLUGS. CHECK ADJUSTMENT OF THE (NORMALLY OPEN) ANTI-SLAM SWITCH, ON THE FRONT DOOR. THESE SWITCHES SHOULD CLOSE WHEN FRONT DOOR IS SLAMMED OR THE BOTTOM OF THE CABINET IS KICKED. EITHER SWITCH WHEN CLOSED WILL ENERGIZE THE DELAY RELAY.

GENERAL GAME OPERATION

PLACE BALL ONTO PLAYFIELD BY OUT HOLE.
PLUG IN THE LINE CORD.

COIN GAME:

IF THE COIN SHOULD BE REJECTED, MOVE ON-OFF MASTER SWITCH AT THE BOTTOM RIGHT FRONT CORNER OF CABINET TO "ON" POSITION, THEN COIN GAME. THE COIN LOCK-OUT DEVICE REJECTS ALL COINS WHEN POWER (MASTER SWITCH) IS OFF.

- 1A. IF THE COIN IS INSERTED IN THE 1ST (NICKEL) COIN CHUTE AND THE GAME IS SET FOR 1 PLAY-5¢, IT WILL ENERGIZE THE "COIN RELAY". IF GAME IS SET FOR 1 PLAY-10¢, THE FIRST COIN INSERTED WILL ADVANCE THE "2 COIN UNIT", THEN THE SECOND COIN INSERTED WILL ENERGIZE THE "COIN RELAY" THRU THE 2 COIN UNIT SWITCH. (SEE 1ST COIN CHUTE ADJUSTMENT PLUG POSITIONS ON GAME ADJUSTMENTS SHEET).
- 1B. IF THE COIN IS INSERTED IN THE 2ND (DIME) COIN CHUTE AND THE GAME IS SET FOR 1 PLAY-10¢, IT WILL ENERGIZE THE "COIN RELAY". IF GAME IS SET FOR 2 PLAYS-10¢, IT WILL ENERGIZE THE "2ND COIN CHUTE RELAY" AND THE 2ND COIN CHUTE RELAY WILL ADVANCE THE "CREDIT UNIT" (2 STEPS) THRU THE COIN CREDIT CIRCUIT. (SEE 2ND COIN CHUTE ADJUSTMENT PLUG POSITIONS ON GAME ADJUSTMENTS).
- 1C. IF THE COIN IS INSERTED IN THE 3RD (QUARTER) COIN CHUTE AND THE GAME IS SET FOR 2-3-4-5-6 PLAYS-25¢, IT WILL ENERGIZE THE "3RD COIN CHUTE RELAY" AND THE 3RD COIN CHUTE RELAY WILL ADVANCE THE "CREDIT UNIT" (2-3-4-5-6 STEPS) THRU THE COIN CREDIT CIRCUIT. (SEE 3RD COIN CHUTE ADJUSTMENT PLUG POSITIONS ON GAME ADJUSTMENTS).
- 1D. WHEN THE "CREDIT UNIT" HAS BEEN ADVANCED FROM THE 2ND OR 3RD COIN CHUTE, (AS DESCRIBED IN SECTION 1B AND 1C) THE FRONT DOOR "CREDIT BUTTON" SWITCH WILL ENERGIZE THE "CREDIT RELAY" AND THEN THE CREDIT RELAY WILL ENERGIZE "COIN RELAY".
- 2A. THE COIN RELAY, WHEN ENERGIZED BY ANY OF THE WAYS DESCRIBED, (IN SECTIONS 1A THRU 1D) WILL STAY ENERGIZED THRU ITS OWN HOLD-IN SWITCH AND (NORMALLY OPEN) #8 SCORE MOTOR SWITCH.
- 2B. THE COIN RELAY WILL ENERGIZE THE LOCK RELAY WHICH STAYS ENERGIZED THRU ITS OWN HOLD-IN SWITCH AND THE NORMALLY CLOSED DELAY RELAY SWITCH.

- 2C. THE COIN RELAY WILL ENERGIZE THE RESET RELAY THRU A GAME OVER RELAY SWITCH; OPERATE THE SCORE MOTOR AND THRU THE (NORMALLY OPEN) #2 SCORE MOTOR SWITCH, ENERGIZE THE SCORE RESET RELAY. THE RESET RELAY WILL STAY ENERGIZED THRU A NORMALLY CLOSED #8 SCORE MOTOR SWITCH, AND UNTIL ALL SCORE COUNTER UNITS ARE RESET TO ZERO POSITION. THE COIN RELAY WILL LATCH THE GAME OVER RELAY THRU THE (NORMALLY OPEN) #4 SCORE MOTOR SWITCH.
- 2D. THE COIN RELAY, THRU THE NORMALLY OPEN #3 MOTOR SWITCH WILL ADVANCE THE TOTAL PLAY METER, AND THRU THE RESET RELAY WILL RESET BALL COUNT UNIT, AND LATCH THE 2ND COIN RELAY. THE COIN RELAY WILL ALSO RESET THE CREDIT UNIT (1 STEP) WHEN STARTED BY THE CREDIT RELAY. THE COIN RELAY WILL TRIP THE 2ND COIN RELAY WHEN THE RESET RELAY IS NOT ENERGIZED.
- 3A. A BALL IN THE OUT HOLE WILL ENERGIZE THE OUT HOLE RELAY THRU A NORMALLY CLOSED #1 SCORE MOTOR SWITCH, AND IT WILL STAY ENERGIZED THRU ITS OWN HOLD-IN SWITCH AND NORMALLY CLOSED #10 SCORE MOTOR SWITCH.
- 3B. THE OUT HOLE RELAY WILL OPERATE THE SCORE MOTOR AND THEN ENERGIZE THE OUT HOLE KICKER SOLENOID THRU A NORMALLY OPEN #7 SCORE MOTOR SWITCH. THE 1ST BALL IS KICKED THRU THE BALL TROUGH TO THE SHOOTER ALLEY AND THE GAME IS NOW READY FOR THE "1ST PLAYER" TO BEGIN PLAY.
- 3C. THE CONDITION THE GAME FOR "2ND PLAYER" INSERTING COIN(S) OR USE OF THE CREDIT BUTTON (BEFORE 1ST BALL IS PLAYED) WILL ENERGIZE THE COIN RELAY AGAIN. THIS TIME THE COIN RELAY WILL NOT ENERGIZE THE RESET RELAY. IT WILL OPERATE THE SCORE MOTOR AND ADVANCE THE TOTAL PLAY METER, SUBTRACT A CREDIT FROM THE CREDIT UNIT, (IF CREDIT BUTTON WAS USED) AND TRIP THE 2ND COIN RELAY THRU A NORMALLY OPEN #3 SCORE MOTOR SWITCH. THE GAME IS NOW SET FOR "2 PLAYERS".

SEQUENCE OF OPERATION

- 1A. WHEN THE 1ST BALL IS PLAYED, THE BALL INDEX RELAY WILL BE ENERGIZED BY THE 10 POINT RELAY, 100 POINT RELAY OR 1000 POINT RELAY, AND IT WILL STAY ENERGIZED THRU ITS OWN HOLD-IN SWITCH, OUTHOLE RELAY SWITCH AND A NORMALLY CLOSED #6 SCORE MOTOR SWITCH.
- 1B. WHEN THE BALL GOES INTO THE OUTHOLE:
 - A. THE BONUS SCORE RELAY IS ENERGIZED AND OPERATES THE SCORE MOTOR TO ADD THE BONUS SCORE TOTAL TOTAL SCORE OF THE PLAYER. WHEN THE SCORING IS COMPLETED, THIS BONUS SCORE RELAY IS DE-ENERGIZED AND THE OUTHOLE RELAY IS ENERGIZED. THE OUTHOLE RELAY WILL REMAIN ENERGIZED THRU ITS OWN LOCK-IN SWITCH UNTIL THE NORMALLY CLOSED #8 SCORE MOTOR CAM SWITCH OPENS.

- 1C. THE OUTHOLE RELAY OPERATES THE SCORE MOTOR AND THRU A BALL INDEX RELAY SWITCH WILL ADVANCE THE BALL COUNT UNIT EITHER TWO STEPS THRU NORMALLY OPEN #3 AND #4 SCORE MOTOR SWITCHES DURING A ONE PLAYER GAME OR ONE STEP THRU A NORMALLY OPEN #4 SCORE MOTOR SWITCH DURING A TWO PLAYER GAME. THE OUTHOLE RELAY THEN COMPLETES THE CIRCUIT TO THE OUTHOLE KICKER SOLENOID THRU A NORMALLY OPEN #7 SCORE MOTOR SWITCH. THE 1ST BALL IS RETURNED TO THE SHOOTER AND THE GAME IS NOW SET FOR EITHER 1ST PLAYER; 2ND BALL OR 2ND PLAYER, 1ST BALL.
- 1D. SEQUENCE 1A, 1B AND 1C ARE THEN REPEATED FOR EACH BALL PLAYED UNTIL THE LAST BALL IS PLAYED. WHEN THE LAST BALL PLAYED RETURNS TO THE OUTHOLE, THE GAME OVER RELAY TRIP COIN WILL BE ENERGIZED THRU THE BALL COUNT UNIT DISC. THE GAME OVER RELAY WHEN TRIPPED WILL TURN OFF THE BALL IN PLAY LITE, TURN ON 00-90 MATCH LITE AND OPEN THE GAME PLAY AND SCORING CIRCUITS.

NOTE: REGULAR BALL TO BALL OPERATION (SEQUENCE 1C) IS INTERRUPTED WHENEVER A PLAYER SCORES AN EXTRA BALL WITH THE EXCEPTION THAT THE OUTHOLE KICKER SOLENOID WILL OPERATE AS INDICATED.

FLIPPER OPERATION:

THE FLIPPERS ARE ACTUATED BY THE PLAYER PRESSING BUTTONS ON THE SIDES OF THE CABINET. THE FLIPPER COILS HAVE TWO WINDINGS; ONE OF HEAVY WIRE THAT PASSES HIGH CURRENT ALLOWING A STRONG INITIAL STROKE; THE SECOND WINDING IS OF LIGHTER WIRE AND IS IN SERIES WITH THE FIRST WINDING. THE LIGHTER WINDING IS SHORTED OUT UNTIL A NORMALLY CLOSED SWITCH IS OPENED BY THE FLIPPER LINKAGE. THIS ALLOWS THE FLIPPER TO BE HELD ENERGIZED AND NOT OVERHEAT BECAUSE LESS CURRENT PASSES THROUGH THE COIL.

FEATURE OPERATION AND SCORING

100,000 SCORE FEATURE:

THERE ARE TWO 100,000 SCORE INTERLOCK RELAYS, ONE FOR EACH PLAYER. WHEN A PLAYER HAS SCORED 100,000 POINTS, THE 100,000 RELAY IS TRIPPED, LIGHTING THE 100,000 LITE ON THE SCORE GLASS. ALL 100,000 RELAYS ARE LATCHED AT THE START OF EACH GAME.

BONUS SCORE FEATURE:

BONUS SCORES OF 1,000 TO 15,000 POINTS IS SCORED WHEN THE BALL GOES INTO THE OUTHOLE OR 2,000 TO 30,000 WHEN THE DOUBLE BONUS LITE IS LIT.

BONUS SCORE BUILD UP STARTS AT 1,000 AND ADVANCES 1,000 POINTS WHENEVER THE BALL GOES OVER EITHER LEFT OR RIGHT BALL RETURN LANE ROLLOVER; WHEN THE SPINNER LITES COMPLETE ONE CYCLE, AND WHEN THE CAPTIVE BALL IN EITHER YELLOW OR GREEN LANE GOES OVER A ROLL-OVER WHEN THE LANE IS LIT.

BONUS SCORE IS RESET AT THE START OF A GAME, WHEN THE GAME IS TILTED AND WHEN A BONUS SCORE IS COLLECTED.

GAME ADJUSTMENTS

PLAYFIELD PANEL POST ADJUSTMENTS:

POSTS THAT CONTROL LEFT AND RIGHT OUTLANE OPENING ON PANEL (SEE PANEL SKETCH) CAN BE MOVED TO MAKE ACCESS TO OUTLANES EASIER OR HARDER FOR BALL TO ENTER.

EASIER ENTRY WILL DECREASE PLAYING TIME AND SCORING.

HARDER ENTRY WILL INCREASE PLAYING TIME AND SCORING.

HI-SCORE ADJUSTMENT PLUG:

LOCATED ON BACK BOX LITE INSERT. THIS PLUG PROVIDES A WIDE RANGE OF COVERAGE AT WHICH HI-SCORE CREDITS CAN BE SCORED. (SEE THE SCORE ADJUSTMENT CARD IN BACK BOX FOR PLUG POSITIONS).

MATCH FEATURE ADJUSTMENT PLUG:

LOCATED ON FRONT CABINET MOUNTING BOARD. THIS PLUG PROVIDES POSITIONS TO OPERATE MATCH FEATRE ON OR OFF.

HI-SCORE FEATURE ADJUSTMENT PLUG:

LOCATED ON FRONT CABINET MOUNTING BOARD. THIS PLUG PROVIDES POSITIONS TO AWARD HI-SCORE CREDIT OR EXTRA BALL.

BALLS PER GAME ADJUSTMENT PLUG:

LOCATED ON FRONT CABINET MOUNTING BOARD. THIS PLUG PROVIDES POSITIONS TO OPERATE GAME ON 5 BALL OR 3 BALL PLAY.

1ST COIN CHUTE ADJUSTMENT PLUG:

LOCATED ON THE 2 COIN UNIT, ON FRONT CABINET MOUNTING BOARD. THIS PLUG PROVIDES POSITIONS TO GIVE 1 PLAY FOR 1 COIN OR 1 PLAY FOR 2 COINS THRU THE 1ST (NICKEL) COIN CHUTE.

2ND COIN CHUTE ADJUSTMENT PLUG:

LOCATED ON FRONT CABINET MOUNTING BOARD. THIS PLUG PROVIDES POSITIONS TO GIVE 1 PLAY FOR 1 COIN OR 2 PLAYS FOR 1 COIN THRU THE 2ND (DIME) COIN CHUTE. NOTE: WHEN THIS PLUG IS SET FOR 2 PLAYS - 1 COIN, BROWN-WHITE (MALE PLUG) WIRE ON 3RD COIN CHUTE ADJUSTMENT MUST BE IN POSITION 2.

3RD COIN CHUTE ADJUSTMENT PLUG:

LOCATED ON FRONT CABINET MOUNTING BOARD. THIS PLUG PROVIDES POSITIONS TO GIVE 2 TO 6 PLAYS FOR 1 COIN THRU THE 3RD (QUARTER) COIN CHUTE. USE ORANGE-WHITE (MALE PLUG) WIRE TO SET NUMBER OF CREDITS.

DOUBLE BONUS FEATURE:

WHEN DOUBLE BONUS LITE IS LIT AND THE BALL GOES INTO THE OUTHOLE, THE GAME WILL AWARD TWICE THE BONUS SCORE LIT. WHENEVER THE DOUBLE BONUS LITE IS LIT, ROLLOVER BUTTONS A-B-C-D ARE ALL LIT.

OUTHOLE BONUS SCORE COLLECT FEATURE:

WHEN THE BALL GOES INTO THE OUTHOLE, THE GAME WILL ADD THE BONUS SCORE LIT TO THE TOTAL SCORE OF THE PLAYER UP. WHEN THE DOUBLE BONUS LITE IS LIT, THE GAME WILL ADD TWICE THE BONUS SCORE LIT.

SPINNER FEATURE:

WHENEVER THE BALL FLIPS THE SPINNER, LOCATED IN THE CENTER OF THE PLAYFIELD, IT WILL SCORE 100 POINTS AND ADVANCE THE SPINNER LI ONE POSITION FOR EACH REVOLUTION. THE SPIN LITE COMPLETES ONE CYCLE, IT WILL ADVANCE THE BONUS SCORE LITE ONE THOUSAND POINTS.

LEFT AND RIGHT LANES FEATURE:

WHEN THE BALL IN PLAY STRIKES A CAPTIVE BALL IN EITHER THE LEFT OR RIGHT LANE, THE CAPTIVE BALL IS KICKED OVER THE ROLL-OVERS AND AT THE TARGET IN THE LANE. THE ROLL-OVERS SCORE 1,000 POINTS; WHEN THE ROLL-OVERS ARE LIT, THEY ADVANCE THE BONUS SCORE LITE. THE TARGET WHEN HIT AWARDS A "SPECIAL" WHEN LIT. THE SPECIAL IS ADJUSTABLE FOR A CREDIT OR AN EXTRA BALL.

ROLL-OVER BUTTON FEATURE:

HITTING "A" TARGET LITES "A" ROLL-OVER BUTTON.
HITTING "B" TARGET LITES "B" ROLL-OVER BUTTON.
HITTING "C" TARGET LITES "C" ROLL-OVER BUTTON.
HITTING "D" TARGET LITES "D" ROLL-OVER BUTTON.

WHEN THE ROLL-OVERS ARE LIT, THEY ADVANCE THE BONUS SCORE LITE. THE LITES REMAIN LIT DURING THE PLAY OF THAT BALL.

WHEN "A", "B", "C" AND "D" ARE LIT, THE DOUBLE BONUS LITE LITES.

EXTRA BALL FEATURE:

EXTRA BALL RELAY IS ENERGIZED WHEN A BALL PASSES THROUGH EITHER THE RIGHT OR LEFT OUT ROLL-OVERS WHEN LIT. ALSO WHEN THE HIGH SCORE ADJUSTMENT PLUG IS SET FOR EXTRA BALL, AND A PRESET HIGH SCORE IS SCORED, OR WHEN RIGHT AND LEFT LANE TARGETS ARE HIT WHEN LIT, FOR SPECIAL. ONLY ONE EXTRA BALL MAY BE EARNED AT ANY ONE TIME.

#1014 FLICKER

PARTS LIST

<u>MISCELLANEOUS</u>	<u>PART NO.</u>	<u>ASSEMBLY COILS</u>	<u>PART NO.</u>
SCORE MOTOR (DOMESTIC)	E-119-354	COIN LOCKOUT	FC-33-2600
SCORE MOTOR (EXPORT)	E-119-411	10,100 & 1000	
TOTAL PLAY METER	E-130-10	CHIMES (3)	CC-31-2000
RESISTOR (COIN LOCKOUT)		KNOCKER	C-27-1000
8200 OHMS, 1/2 WATT	E-105-6	THUMPER-BUMPER	A-25-1000
TRANSFORMER	E-122-95	OUTHOLE KICKER	A-25-950
		SLING-SHOTS (2)	A-26-1200
		FLIPPERS (2)	AF-25-600/ 28-800
<u>RELAY COILS</u>		<u>UNITS COILS</u>	
DELAY	G-31-1600	2 COIN (STEP-UP)	CD-29-1600
COIN	G-31-2000	CREDIT (STEP-UP)	B-26-1100
2ND COIN CHUTE	G-31-2000	CREDIT (RESET)	C-28-1100
3RD COIN CHUTE	G-31-2000	BALL COUNT (STEP-UP)	B-26-1100
CREDIT	G-31-2000	BALL COUNT (RESET)	C-28-1100
LOCK	G-33-2800	00-90 (STEP-UP)	CD-29-1600
RESET	G-31-2000	SCORE DRUMS (STEP UP)(8)	CD-29-1600
2ND COIN (TRIP)	G-31-2000	BONUS (STEP UP)	B-26-1100
2ND COIN (LATCH)	G-31-2000	BONUS (RESET)	C-28-1100
GAME OVER (TRIP)	G-31-2000	SPINNER	CD-29-1600
GAME OVER (LATCH)	G-31-2000		
2ND PLAYER RELAY (A)	G-32-2500		
2ND PLAYER RELAY (B)	G-32-2500		
#1 SCORE RESET	G-30-1500		
1ST & 2ND PLAYER			
100,000 (TRIP)	G-31-2000	<u>UNIT DISCS</u>	
1ST & 2ND PLAYER		BALL COUNT	W-1043-13
100,000 (LATCH)	G-31-2000	00-90	W-999-29
BONUS ZERO	G-32-2500		W-999-28
BONUS SCORE	G-31-2000	BONUS	W-1072-40
OUTHOLE	G-31-2000		
BALL INDEX	G-32-2500		
EXTRA BALL	G-32-2500	UNIT WIPERS	
TILT	G-32-2500	BALL COUNT	AS-1046-618
BONUS ADVANCE	G-31-2000	00-90	AS-1618-3
LITE "A" ROLL-OVER	G-32-2500		AS-1618-4
LITE "B" ROLL-OVER	G-32-2500	BONUS	AS-1046-739
LITE "C" ROLL-OVER	G-32-2500		
LITE "D" ROLL-OVER	G-32-2500		
DOUBLE BONUS	G-32-2500		
500 POINT	G-31-2000		
1000 POINT	G-31-2000		
100 POINT	G-31-2000		
10 POINT	G-31-2000		
THUMPER-BUMPER	G-31-2000		
SPINNER	G-30-1500		
15000BONUS	G-32-2500		
SPECIAL	G-31-2000		
TOP HOLE	G-32-2500		

#1014 "FLICKER"

#1 MOTOR CAM SWITCHES

- #1A (BREAK) OPENS CIRCUIT TO COIN LOCKOUT COIL WHEN MOTOR RUNS.
- #1B (BREAK) HOLDS OUTHOLE RELAY OUT UNTIL MOTOR IS AT REST.
- #1C (MAKE-BREAK) OPENS CIRCUIT THRU CREDIT BUTTON & RUNS SCORE MOTOR.

#2 MOTOR CAM SWITCHES

- #2A (MAKE) PULSES SCORE RESET RELAY.
- #2B (MAKE) FAST RESET OF BONUS UNIT WHEN TILT OR RESET RELAY SWITCHES ARE CLOSED.
- #2C (MAKE) SCORES 500 POINTS WHEN 500 POINT RELAY IS ENERGIZED.

#3 MOTOR CAM SWITCHES

- #3A (MAKE) STEPS BALL COUNT UNIT ONE STEP WHEN 2ND COIN RELAY IS LATCHED.
- #3B (MAKE) OPERATES TOTAL PLAY METER.
- #3C (MAKE) WITH #6A SWITCH ADDS 1000 UNIT WHEN BONUS RELAY IS ENERGIZED.

#4 CAM SWITCHES

- #4A (MAKE) STEPS BALL COUNT UNIT ONE STEP WITH OUTHOLE RELAY IN.
- #4B (MAKE) LATCHES GAME OVER RELAY ON RESET.
- #4C (MAKE) WITH SWITCH #7D, SCORES 1000 POINTS EACH WHEN DOUBLE BONUS RELAY IS ENERGIZED.

#5 MOTOR CAM SWITCHES

- #5A (MAKE) WITH SWITCH #8A AND THRU BONUS SCORE RELAY, RESETS BONUS UNIT.
- #5B (BREAK) ADJUSTMENT FOR 2ND & 3RD COIN CHUTE RELAYS TO ADD 2 CREDITS.

#6 MOTOR CAM SWITCHES

- #6A (MAKE) SEE SWITCH #3C.
- #6B (BREAK) BALL INDEX, TILT AND EXTRA BALL RELAY LOCK IN.
- #6C (BREAK) ADJUSTMENT FOR 2ND & 3RD COIN CHUTE RELAYS TO ADD 3 CREDITS.

#7 MOTOR CAM SWITCHES

- #7A (MAKE) LATCHES 1ST & 2ND PLAYER RELAYS THRU COIN RELAY.
- #7B (MAKE) ENERGIZES OUTHOLE AND TOP HOLE KICKERS.
- #7C (MAKE) MOVES BONUS UNIT ONE STEP WHEN OUTHOLE RELAY IS ENERGIZED.
- #7D (MAKE) SEE MOTOR SWITCH #4C.
- #7E (BREAK) CREDIT RELAY LOCKS IN AND 4 COUNT ADJUSTMENT FOR 3RD COIN CHUTE RELAY.

#8 MOTOR CAM SWITCHES

- #8A (MAKE) SEE MOTOR SWITCH #5A.
- #8B (BREAK) OUTHOLE RELAY LOCK IN.
- #8C (BREAK) 500 POINT RELAY LOCK IN.
- #8D (BREAK) LOCKS IN RESET RELAY UNTIL MOTOR NEAR END OF CYCLE.
- #8E (BREAK) COIN RELAY LOCK IN AND FIVE COUNT ADJUSTMENT FOR 3RD COIN RELAY.

#9 MOTOR CAM SWITCHES

- #9 (MAKE) SCORES 300 POINTS WHEN TOP HOLE RELAY IS ENERGIZED.

#10 MOTOR CAM SWITCHES

- #10A (BREAK) SAFETY LOCK IN FOR COIN RELAYS AND CREDIT RELAY.

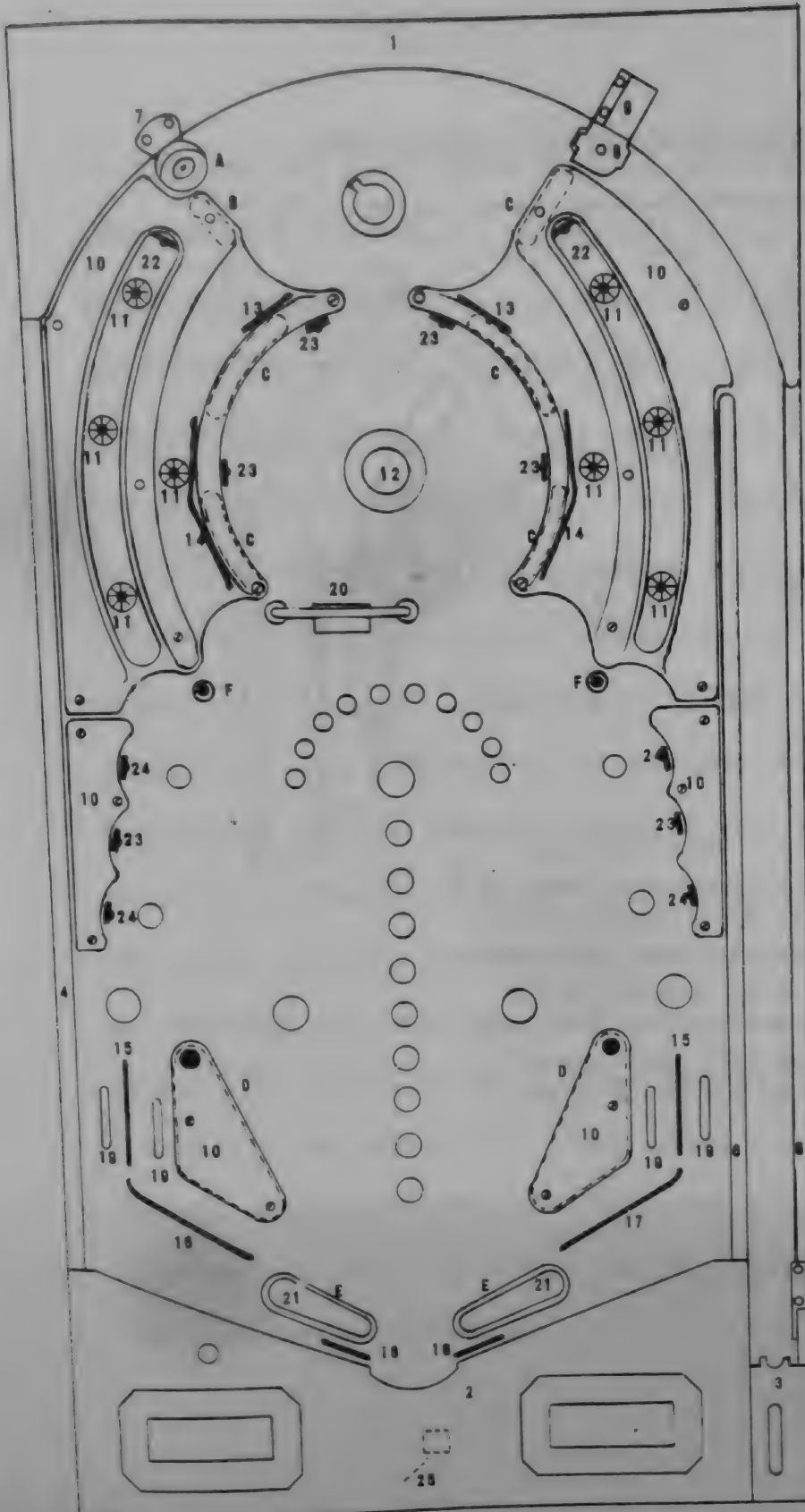
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RUBBER PARTS

A- R-115-4	REBOUND	1
B- R-521-1	1'	1
C- R-521-2	1-1/2'	5
D- R-521-5	3'	2
E- R-408-3	FLIPPER	2
F- R-243	5/16	15

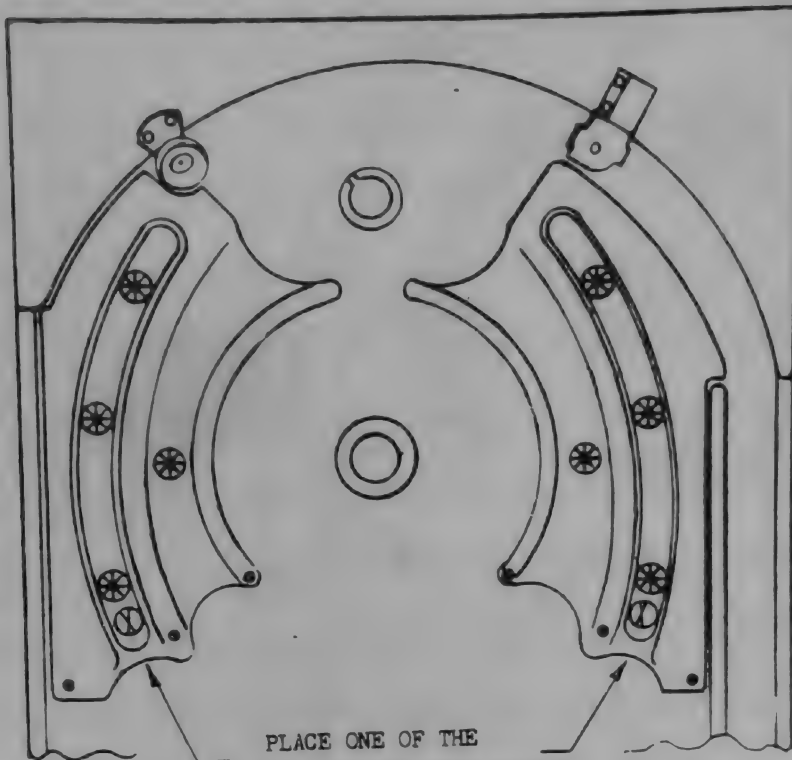
PANEL TOP PARTS

1- TOP ARCH	P-5838-88
2- BOTTOM ARCH	P-5871-47
3- SHOOTER GAUGE	P-8358-13
4- SIDE RAIL	CA-1208-24
5- SIDE RAIL	CA-1208-22
6- INNER RAIL	CA-1208-14
7- REBOUND ASSEMBLY	AS-493-3
8- BALL GATE	A-1475-1
8- BALL GATE COVER	P-2698-5
10- LITE SHIELDS	A-2880-101
11- ROLLOVER BUTTON (8)	C-800
12- BUMPER CAP (BLUE)	A-3713-11
13- GUIDE WIRE (2)	M-121-24
14- GUIDE WIRE (2)	M-121-54
15- GUIDE WIRE (2)	M-121-18
16- GUIDE WIRE	M-121-43
17- GUIDE WIRE	M-121-44
18- GUIDE WIRE (2)	M-121-53
18- ROLLOVER WIRE (4)	M-1338
20- SPINNER GATE ASSEMBLY	AS-2250-32
21- FLIPPER & PIN ASSEMBLY	AS-2214-18
22- TARGET & SWITCH ASSEMBLY (RED)	AS-882-800
23- TARGET & SWITCH ASSEMBLY (YELLOW)	AS-882-740
24- TARGET & SWITCH ASSEMBLY (WHITE)	AS-882-806
25- BALL RETURN WIRE	M-1338-21



● INDICATES MOVABLE POSTS
FOR SCORING ADJUSTMENT.

INSTRUCTIONS FOR PLACING BALL IN SPECIAL LINES



PLACE ONE OF THE
1-1/16" BALLS IN THE LEFT LANE X
AND ONE IN THE RIGHT LANE (X)
PLACE THE OTHER 1/16" BALL
ON THE PLAYFIELD AND THE
REMAINING 15/16" BALL GOES INTO
THE "TILT TRACK" LOCATED ON
THE LEFT SIDE OF CABINET.

TIME DELAY CIRCUIT

Purpose of the time delay circuit is to prevent unnecessary abuse of the machine it is installed in.

The time delay relay is energized anytime one of the slam switches are made to contact. There are two factory installed slam switches, one on the front door and one on the mechanism mounting board. (Any number of slam switches could be installed by the operator, to meet his individual requirement). The switches should be adjusted to have approximately 1/16" gap between the contacts. The weighted blade should be adjusted to attain the desired sensitivity. Decreasing the gap between contacts will make switch more sensitive. Opening the gap will reduce sensitivity.

The total time the delay relay is energized can be varied by changing the #455 lite bulb mounted on the delay relay frame. If unable to get a short enough time of delay, get a Westinghouse #455 bulb; these units are considerably faster. If still unable to bring the time down, check the location voltage. It should not be under 49.5 V.A.C. on the transformer secondary.

BALLY MFG. CORP.

Jan. 5, 1971

NEW COIL NUMBERS

FC-319a

OLD COIL NUMBERNEW BALLY COIL NUMBER

CO-25A-7	A-25-1050
CO-25GG-7	B-25-925
CO-25H-7	BC-25-925
CO-26A-9	A-26-1100
CO-26GG-9	B-26-1100
CO-27R-11	C-27-1000
CO-28R-15	C-28-1100
E-184-41	BF-27-1250
E-184-46	EA-30-1150
E-184-47	EA-32-1550
E-184-55	B-29-1200
E-184-56	A-27-1100
E-184-74	CF-28-1025
E-184-75	E-32-1700
E-184-112	EA-29-950
E-184-135	BA-25-925
E-184-155	D-27-425
E-184-156	D-28-500
E-184-160	B-25-750
E-184-175	AP-27-1300
E-184-180	CE-33-4800
E-184-190	AF-25-600/31-1000
E-184-204	AF-27-1000/32-1300
E-184-205	B-27-1300
E-184-206	CD-29-1500
E-184-207	A-27-1400
E-184-213	A-27-1300
E-184-218	F-31-1500
E-184-224	F-31-2100
E-184-231	JA-29-800/31-900
E-184-235	AK-25-1050
E-184-236	J-28-1100
E-184-237	BA-26-1040
E-184-241	AF-25-600/31-1000
E-184-243	A-26-1200
E-184-248	FC-30-1300
E-184-249	BF-28-1300
E-184-260	D-30-700
E-184-262	BB-26-655/32-1255
E-184-264	FC-30-1450
E-184-267	AP-25-1050
E-184-269	B-28-1500
E-184-261	AF-31-3000
E-184-262	A-26-1200
E-184-263	AF-27-1000/31-261
E-184-264	A-28-1900
E-184-265	AF-25-600/31-1000
E-184-266	D-28-675
E-184-268	AF-26-750/31-900
E-184-269	FC-32-2600
E-184-270	AB-31-1000
E-184-271	AB-24-700
E-184-272	A-27-1000
E-184-274	F-31-2-2200

INCANDESCENT LAMP

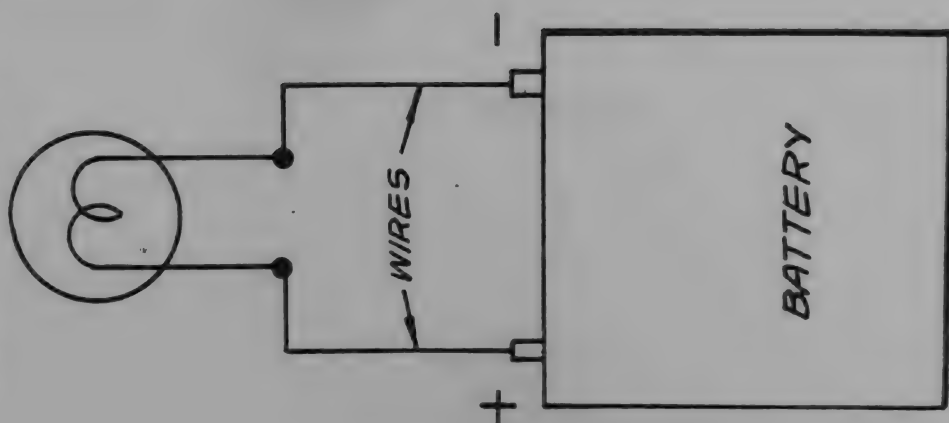


EXHIBIT E

INCANDESCENT LAMP

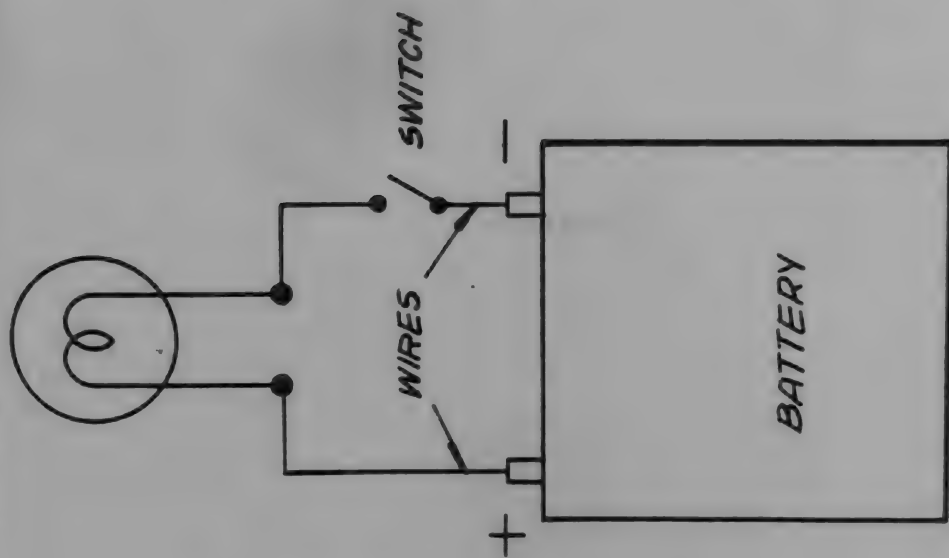


EXHIBIT F

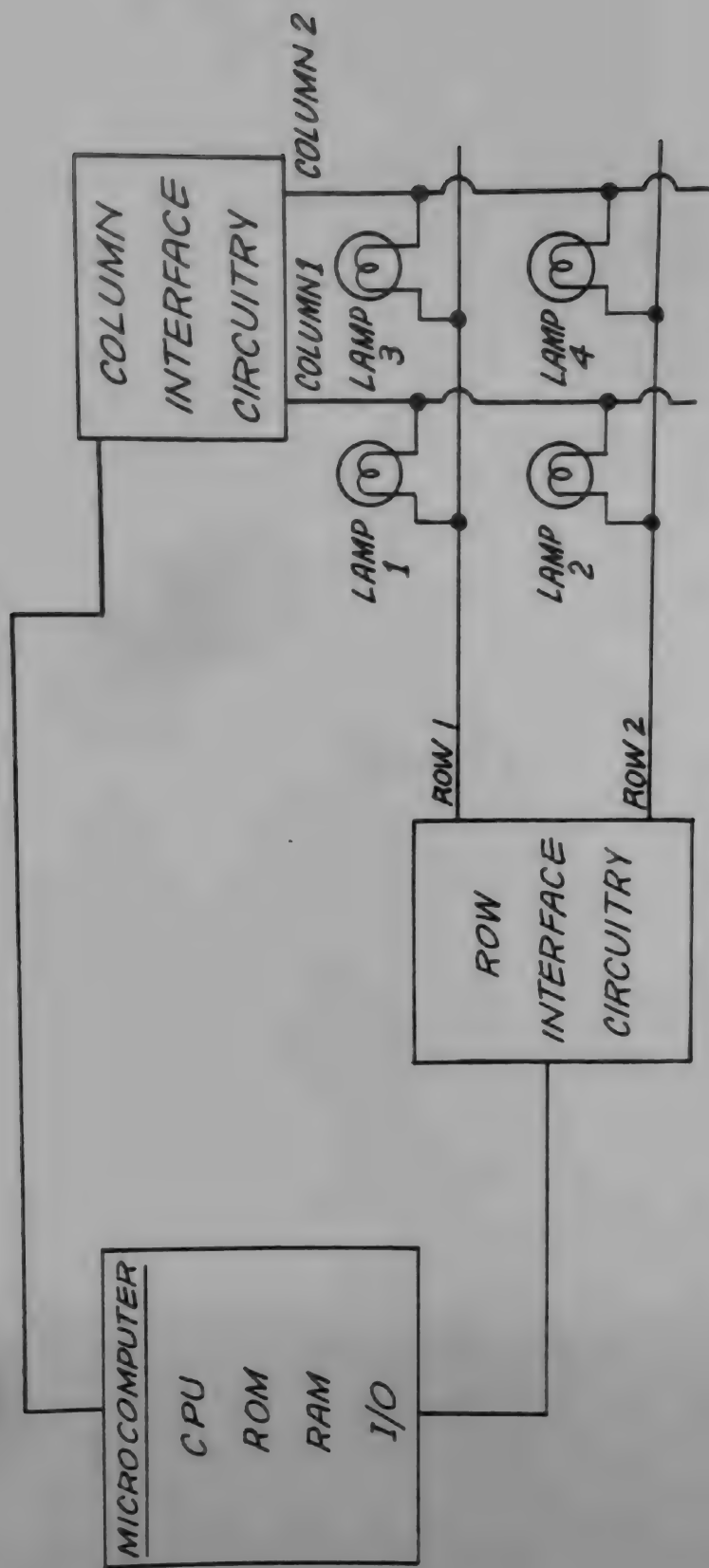


EXHIBIT G

INCANDESCENT LAMP

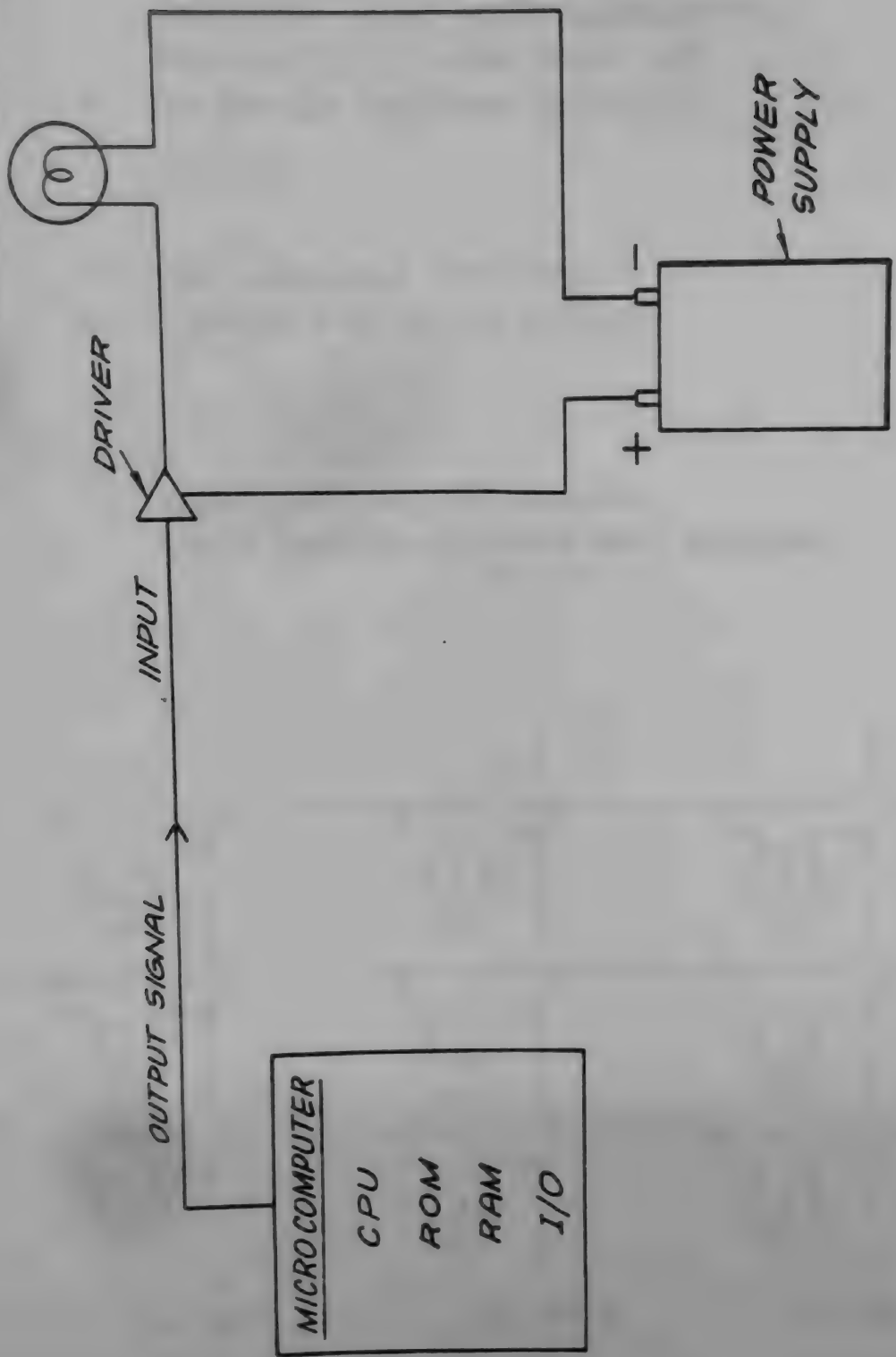
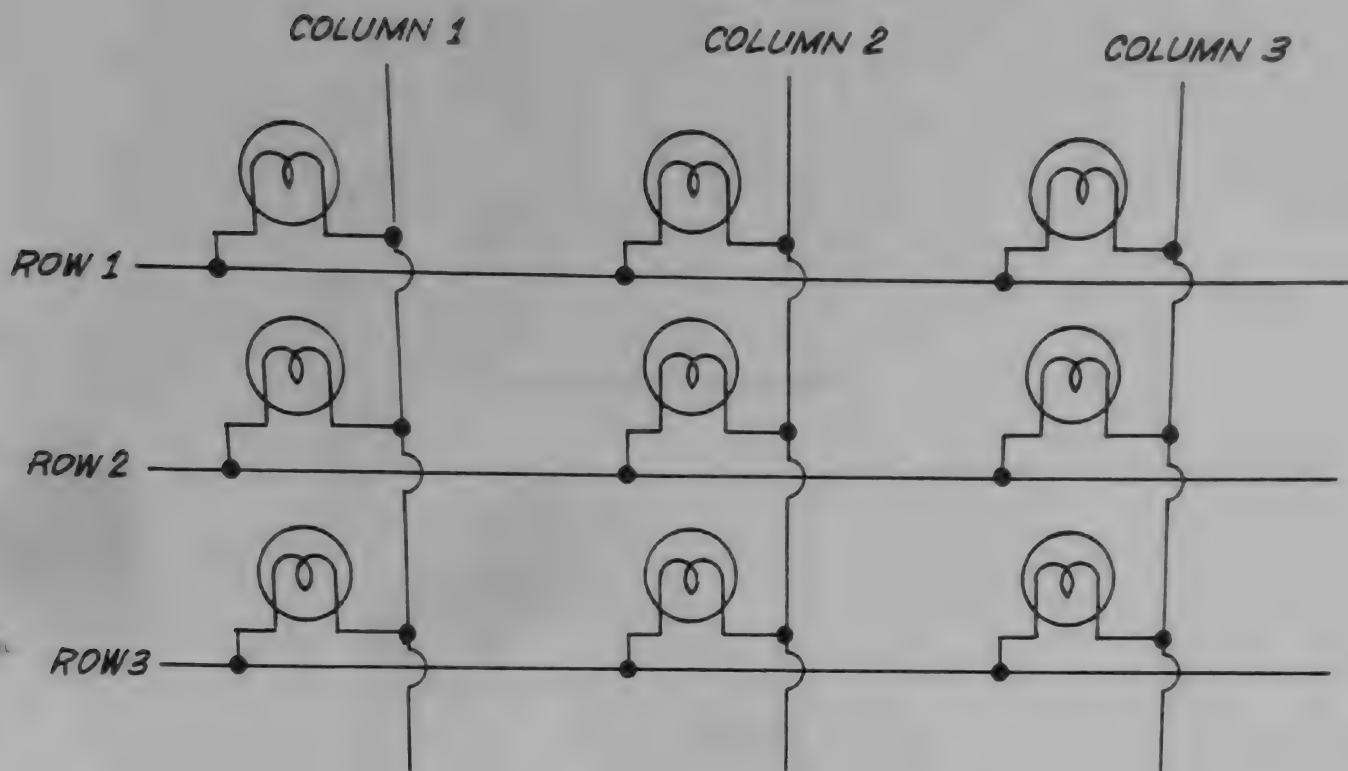


EXHIBIT H

CYCLIC & SEQUENTIAL MULTIPLEXING



*CYCLE THROUGH COLUMNS FAST ENOUGH
FOR REAL TIME RESPONSE:*

- *LIGHTS AND DIGITS APPEAR
CONTINUOUSLY LIGHTED*
- *NO SWITCH CLOSURE IS MISSED
OR DETECTED LATER THAN ITS'
REQUIRED REAL TIME RESPONSE*

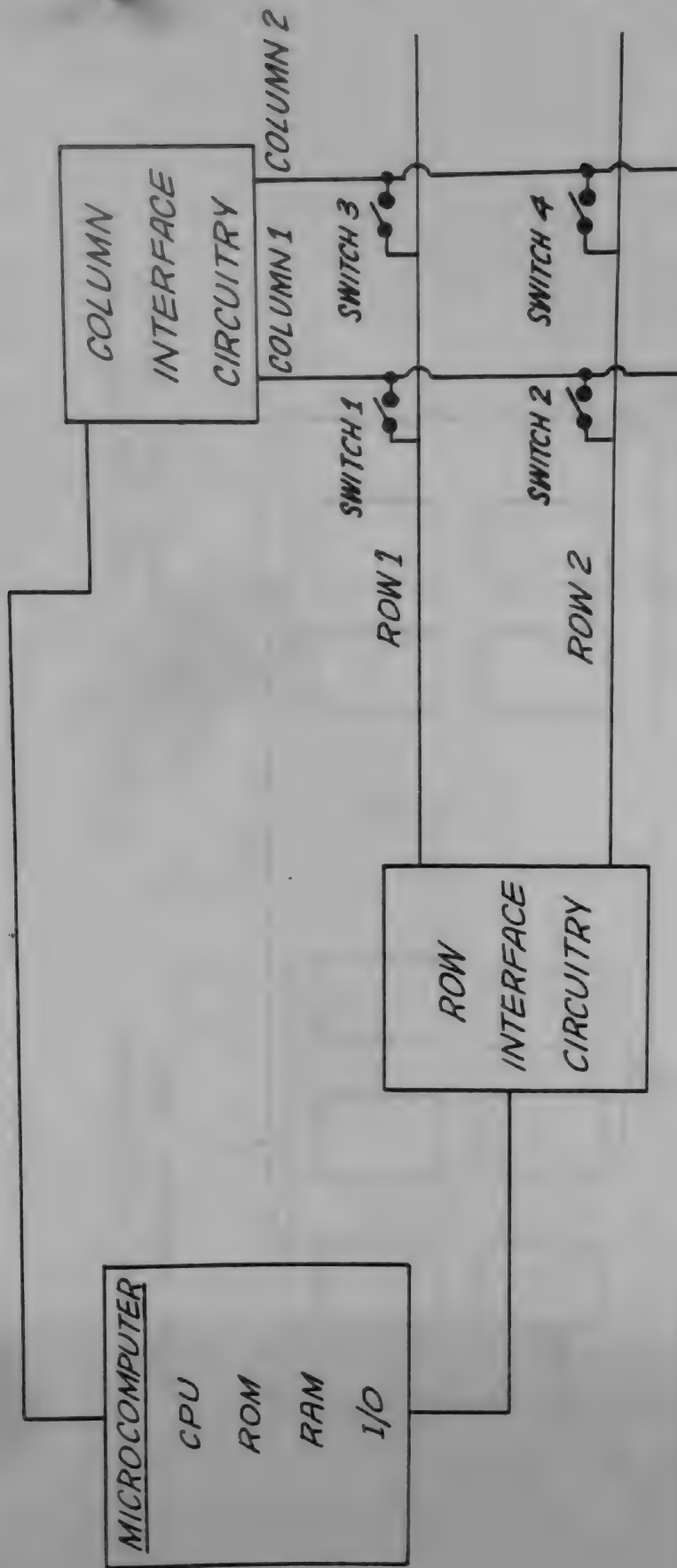
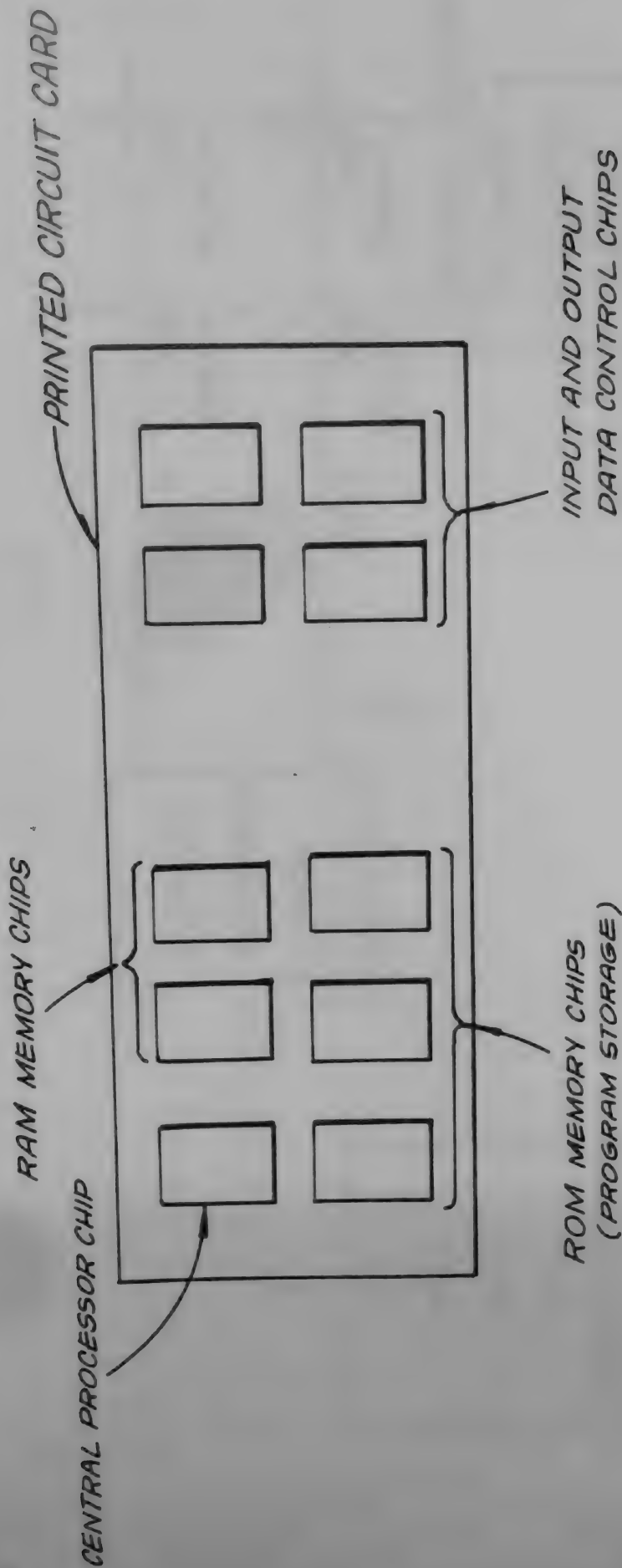


EXHIBIT I

MICRO COMPUTER



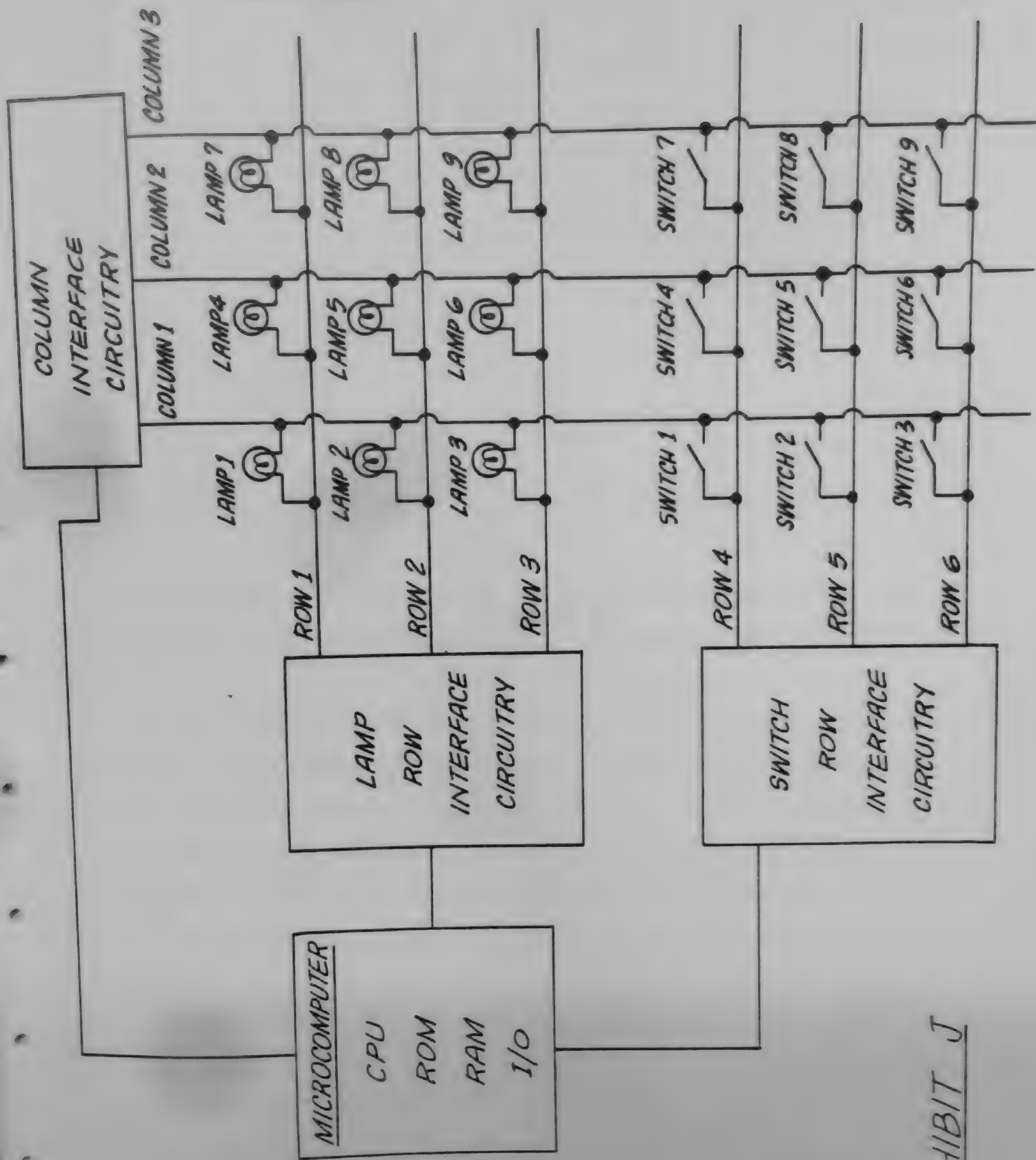


EXHIBIT J

RELAYS (G-TYPE)

PURPOSE When electrical current flows thru the coil a magnetic field results. This field attracts the armature flap and mechanically actuates the switches. Thus, by a single action of completing the circuit to the relay coil, any number of individual circuits can be controlled thru the associated relay switches.

A single pulse to the relay coil in conjunction with a lock in switch can hold in the circuits until a certain function is completed. This is useful in cases of multiple scoring, stepping up or resetting a unit or where a definite sequence of operation is necessary.

ADJUSTMENTS The gap and follow thru specifications should be used as a guide, and some judgement must be exercised to insure that the adjusted gap will perform properly under the use conditions.

All switch adjustment must originate with the plastic switch actuator in de-energized position. After switch adjustments are completed the actuator should automatically return to this position. All switch adjustments must be done with a stroking action of the adjusting tool and no sharp bend at the switch spacers. Before adjusting switches, make sure the tip of the long blades are centered in the slots of the switch actuator, otherwise they will hamper the movement of the switch actuator. Tighten down the screws that hold the switch assembly. This is suggested because the plastic spacers in the switch stacks will occasionally shrink by drying out, causing a poor adjustment. When switches are properly adjusted, there should be about 1/32" follow thru, except in case of lock in switches which should be slightly more. This "follow thru" action provides a wiping motion between contacts, keeping them clean.

NORMALLY OPEN SWITCHES Hold switch actuator in top position. Adjust long blade so the tip rests lightly (10 grams pressure) on upper side of slot in plastic switch actuator. Adjust short blades to 1/32" clearance between contact points, except on lock in switch 1/64" clearance.

NORMALLY CLOSED SWITCHES Hold switch actuator in top position while adjusting long blade so the tip rests lightly (10 grams pressure) on upper side of slot in plastic switch actuator. It may be necessary to adjust short blade away from the long blade. Hold switch actuator in down position while adjusting short blades to 1/32" clearance between contact points.

The armature spring should have enough tension to bring the armature up against the armature stop when the relay is not energized. See that pressure from poorly adjusted switches is not affecting the armature before attempting adjustment on the spring.

If a relay "chatters" or "hums", check to see that switches, located on it, are not out of adjustment and causing too much upward tension on the armature. In some cases the trouble can be due to foreign matter on top of the relay coil core. This can be removed with a small file.

INTERLOCK RELAY

Functionally this type of relay is the same as other relays, differing only in that it is "locked in" mechanically although the coil is de-energized.

It consists of a regular relay plus an additional coil and armature plate, place in a position so that when one coil is momentarily energized it will pull its armature down and allow the other armature to slide over it. Thus holding it mechanically in that position until the other coil is momentarily energized and the process is repeated in reverse.

The coil and armature assembly containing the switch stack is called the "latch" coil, sometimes referred to as the "reset coil". The coil with only the armature is called the "trip coil".

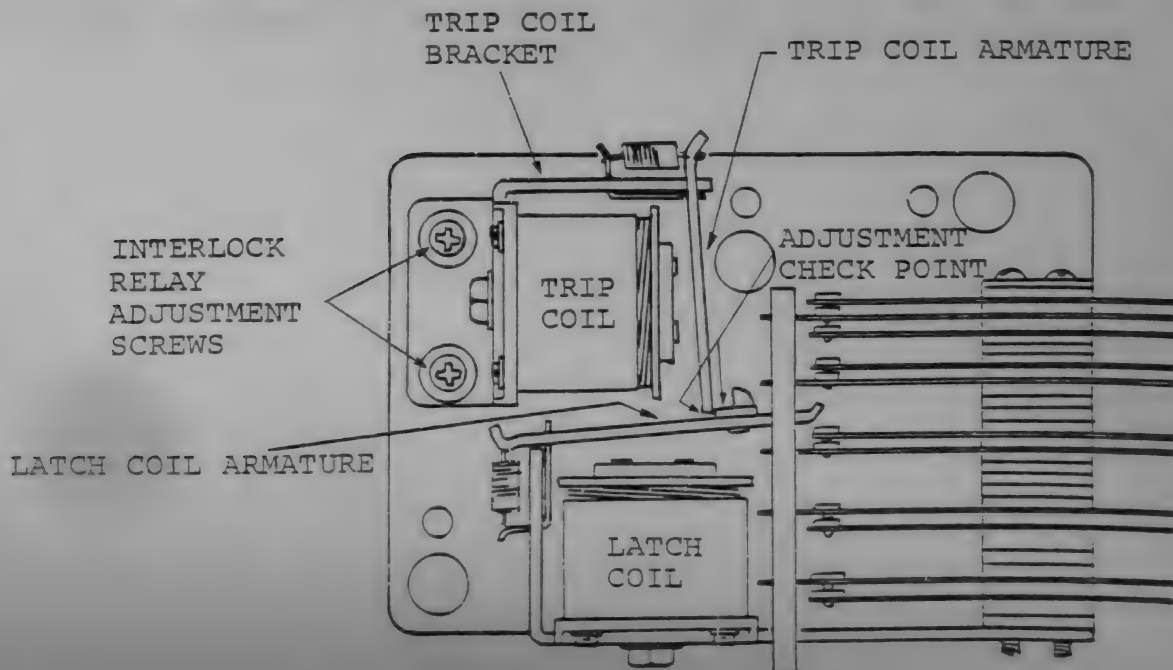
ADJUSTMENT

Hold the latch armature down directly over the center of the latch coil, there should be a .010" gap between the trip coil armature and the nylon piece.

Hold the trip coil armature down, there should be about .010" between the two armatures.

Adjustment of the gap are made by loosening the screws holding the trip coil in place. Be sure to tighten down the screws after adjustment is completed.

The switch adjustments are the same as that for a regular relay.





**UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office**

Address : COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NO
5,784	8/25/78	David J. Nutting et al	

Hitch, Even, Tabin, Flannery & Welsh
335 South LaSalle Street
Chicago, IL 60603

EXAMINER	
Hum, V.	
ART UNIT	PAPER NUMBER
334	145

DATE MAILED:

See find below a communication from the EXAMINER in charge of this application.

Commissioner of Patents.

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS ACTION IS SET
TO EXPIRE 1 MONTH ~~FROM~~ FROM THE DATE OF THIS LETTER.

This communication is responsive to Reissue applicants' submissions, Paper Nos. 118, 121, filed in response to the final rejection of Paper Nos. 114 and 117. Paper Nos. 121, 126, 128, 142 and 144 have also been filed by Reissue applicants in compliance with the Examiner's Request for Additional Information, Paper No. 122 and in reply to Protestors' varied submissions, Paper Nos. 116, 119, 120, 133, 141 and 143.

Upon careful evaluation of the extensive exhibits, depositions, evidence, etc., newly presented by both parties, the examiner has found the following with respect to the Section 102(a) and Section 102(a)/103 issues:

1. that an "open house" for employees and affiliates of Cyan/Atari did occur at the Cyan premises in the Litton Building in May/June, 1974:

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2. that the Eigen personnel and the Litton brothers (if the latter were in attendance) had a confidential relationship with Cyan (See Paper Nos. 118 and 126);
3. that family members and casual visitors present at the "open house" or visiting Cyan facilities were there to tour the facilities or visit Cyan personnel and not for the express purpose of viewing the El Toro pinball machine. Bergstrom v. Sears Roebuck and Co., 457 F. Supp. 213, 199 U.S.P.Q. 269 (D.C. Minn. 1978), affirmed, 599 F.2d 62, 203 U.S.P.Q. 121 (8th Cir. 1979);
4. that there is no evidence to clearly and convincingly show that the El Toro pinball machine was accessible to a member of the public in an unrestricted way or that anyone actually viewed the subject device other than Litton, Eigen, Cyan or Atari personnel or casual visitors to Cyan; and
5. that even if casual visitors did observe the El Toro, it is questionable whether they would have been able to glean the technological complexities from visual impressions to be able to convey to the public the subject device. Bergstrom v. Sears, supra. Cf. Watson v. Allen, 254 F.2d 342, 117 U.S.P.Q. 68 (D.C. Cir. 1958), affirming, 114 U.S.P.Q. 214 (D.D.C. 1957). But cf. In re Blaisdell, 242 F.2d 779, 113 U.S.P.Q. 289 (CCPA 1957). (Both Blaisdell and Allen lost control of their respective inventions to public while the instant situation does not).

Thus, the rejections under 35 U.S.C. 102(a) and 102(a)/103 have been withdrawn.

In regard to the 35 U.S.C. 102(g) and 102(g)/103 issues, the examiner has reconsidered all of the issues in light of the evidence of record. The major question is whether the El Toro pin-ball machine was actually a reduction to practice. While it is recognized that reduction to practice under 35 U.S.C. 102(g) needn't¹ be of commercial quality, it should have been tested under actual working conditions to the extent of ascertaining practical utility of its intended purpose beyond probability of failure. Field v. Knowles, 86 U.S.P.Q. 373, 379 (CCPA 1950); Steinberg v. Seitz, 186 U.S.P.Q. 209, 212 (CCPA 1975). However, in the event of failure, if by virtue of the simplicity of the invention such could obviously be corrected then a reduction to practice could still be sustained. Piher at 916, 918.

In the El Toro stage evidence exists to show that it was susceptible to switches "hanging up". And despite further work this failure was apparently not corrected as noted by the evidentiary record. Although such might have been construed to fall within the context of Piher, of the two Delta Queen showings, the one shown at the MOA conference was apparently successful while the Frank's Pizza Parlor device was not. Clearly, it can be seen that this represents a 50% probability of failure. Even though Atari/Cyan should have learned from the El Toro experimental stage and applied such learning to the two Delta Queens to eliminate the "bombing" such was not apparently done. It is apparent that they still did not have control of the device. Coupled with the newly supplied arguments, submissions and the fact that the programmer (Cox) did not correct the program to

¹ Piher, S.A. v. CTS Corp., 212 U.S.P.Q. 914, 918 (7th Cir. 1981).

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eliminate the inherent problems and Cyan, despite testimony that various noise reduction techniques were conventional in the art, was not able to cure the defects in the Delta Queen at Frank's, the examiner now finds that the El Toro was not reduced to practice for the purposes of a 35 U.S.C. 102(g) and 102(g)/103 rejection.

Upon reconsideration of the obviousness issue raised by Protestors in Paper No. 119 as a reply to the final rejection, the examiner has carefully weighed arguments from both parties. The authority relied upon is Graham v. John Deere, 383 U.S. 1, 148 U.S.P.Q. 459 (1966)².

The inclusion of the March 21, 1974 Electronics article would, on the face of it, seem to be suggestive of the hybrid combination proposed by Protestors to establish a prima facie case of obviousness. Up to the moment of Reissue applicants' conception there did not exist a computer based pinball device. The Burnside patent did, however, show a multiplexed electromechanical arrangement for cyclicly and sequentially scanning contacts (e.g. note column 4) made "hot" by ball actuated switches and lights for use in a surface projectile game prior to applicants' invention. And the MCS-4 disclosure also prior to applicants' invention did disclose switch scanning as argued by Protestors.

²Under section 103, scope and content of prior art are to be determined, differences between prior art and claims are to be ascertained, and level of ordinary skill in the pertinent art resolved; against this background, obviousness of subject matter is determined; such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to circumstances surrounding origin of subject matter sought to be patented; as indicia of obviousness, these inquiries may have relevancy.

The third consideration to be resolved is the level of skill to be attributed to the art. Clearly Atari/Cyan has been recognized as a company with a widely known reputation in the electronic game discipline. Moreover, the courts are cognizant of Atari's credentials and mentions same in Magnavox Company v. Chicago Dynamic Industries, 201 U.S.P.Q. 25, 27 (D.C. N111 1979).

At first blush it would appear that the groundwork has been laid in accordance to the Graham decision to support a case for obviousness. However, upon careful evaluation of all of the evidence certain facts have been considered.

1. In the November 1973 EE/Systems Engineering Today article Ross Schier of Bally, one considered ordinarily skilled in the art, indicated skepticism. Reading further on page 38 of that article, such skepticism was apparently widespread in the industry.
2. Prior to December of 1973, computerized pinball devices of the nature of the instant invention were not present in the industry.
3. Applicant began work on the subject invention around the November-December 1973 time frame.
4. Atari/Cyan's electronic pinball program was documented around February 1974.
5. An advertisement appeared in the March 21, 1974 edition of Electronics suggesting use of a microprocessor in a pinball machine along with the advantages for such a conversion.
6. In the May-June 1974 time frame Atari/Cyan had an open house for company personnel, family and affiliates.

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7. The El Toro externally cabled microcomputer apparatus was shown at the open house along with other devices presently being developed at the Cyan facilities.
8. The El Toro was susceptible to "hanging up" or "bombing".
9. Sometime after the May-June 1974 open house but before October-November 1974 the El Toro machine was dismantled and the experimentation on that machine terminated.
10. Sometime after the May-June 1974 open house but before October-November 1974 the Delta Queen experimental stage commenced.
11. Reissue applicants reduced to practice the subject invention September 26, 1974.
12. Reissue applicants demonstrated same to Bally on September 26, 1974.
13. After viewing the subject invention, Bally proceeded to develop their own version of a microcomputer based pin-ball machine culminating in the Bracha patent, Patent No. 4,198,051.
14. A Delta Queen, one of five identical devices was successfully shown at the October-November 1974 MCA showing.
15. Another one of the five identical machines was unsuccessfully placed at Frank's pizza parlor between December 1974 and January 1975 due to "bombing".
16. A Cyan status report dated February 7, 1975 (Federal Rules of Evidence, Rule 803) recognized problems in the Delta Queen experimental stage.

17. A revamped version of the Delta Queen was successfully shown at the April 1975 Asilomar conference.
18. In 1976 the subject invention was being commercialized by Midway, a subsidiary of Bally.
19. Sometime between late 1977 and early 1978 Bally acquired the subject invention and Reissue applicants' company.
20. A license agreement was negotiated October 5, 1978 between Stern Electronics and Bally (now owner of Patent No. 4,093,232, subject of the instant Reissue application) Paper No. 109, Exhibit DB.
21. Royalties to the order of \$700,000 were paid by Stern through September 1981 in accordance to the provisions of the negotiated license; Paper No. 109, Exhibit DA.
22. Between 1977 and 1978, there was industry wide acceptance of electronic/solid state pinball games as evidenced by an industry survey conducted by Playmeter Magazine, November 1978 edition. See attachment A appended to this decision.

From an evaluation of the substantial evidence of record, the record would seem to support a finding of unobviousness on the basis of what actually did occur in the art and secondary considerations set forth in the Graham case.

Prior to Reissue applicants' invention the possibility of a computerized/solid state pinball machine was proposed but no known device of this nature was being developed. Apparently the major pinball concerns were not interested and somewhat skeptical of this approach, EE/Systems Engineering Today. Even after Reissue applicants began their computerized pinball project, there is no indication that the industrial leaders started their own ventures in this area despite

the suggestion of the March 21, 1974 Electronics article. Only video technology experts Atari and Ramtek mounted programs in this direction.

Once the programs were started, the evidentiary record shows that problems were encountered. There is considerable debate at this juncture as to whether noise should be an issue and whether the lack of solution thereto was indicative of unobviousness in the overall developmental procedure. The examiner has concluded from the evidence that while some noise reduction techniques are conventional in the electronic art and while Atari and Ramtek as well as Reissue applicants received help from companies such as Intel, Rockwell, etc., Atari and Ramtek did not seem able to overcome these problems at least as of May-June 1974. And even upon further experimentation Atari was not able to overcome these deficiencies in the Delta Queen until at least 1975. See the discussion in the treatment of the 35 U.S.C. 102(g) and 102(g)/103 rejections. In further regard to this issue, the examiner's findings appearing on pages 6-10 of Paper No. 61, the third Office action, would appear to be apropos and are being incorporated by reference and are appended to this decision as an attachment.

So when one has compared what actually transpired in the art to the theoretical possibilities of incorporating a microcomputer (e.g. the MCS-4) in a conventional "pinball" machine (e.g. Burnside Patent No. 2,864,619) as suggested by the March 21, 1974 Electronics article and proposed by Protestors, the strength of the arguments in favor therefor diminishes.

In further consideration of the collateral facts relating to the

1. spurring of others (i.e. Bally), once having seen the operative model of the subject invention, into activity (i.e. the Bracha patent),

2. skepticism on the part of those skilled in the art (pages 17 and 18 of Paper No. 121, received May 5, 1982),
3. recognition of worth and acquisition of the subject invention by an industry leader (Bally),
4. licensing of the subject invention to a competitor and subsequent royalty payments therefor, and
5. general acceptance in the industry as reported in the Playmeter survey,

it is clear that the above would have qualified as the secondary considerations found in Graham. Accord, Magnavox Co. v. Chicago Dynamic Industries, supra.

In conclusion, the 35 U.S.C. 103 rejection founded on Burnside or Durant in view of Electronics and MCS-4 would not have been sustainable in light of the above discussion.

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Summary

The various submissions supplied by Reissue applicants after the final rejection have been accorded entry.

The rejections under 35 U.S.C. 102(a) and 102(a)/103 have been withdrawn.

The rejections under 35 U.S.C. 102(g) and 102(g)/103 have been withdrawn.

The proposed rejection under 35 U.S.C. 103 has been refused.

The claims of record have been found to avoid the prior art.

Applicants' offer to supply a new program listing, Paper No. 130, is accepted. See M.P.E.P. 608.05 and 37 C.F.R. 1.96.

Accordingly prosecution before the examiner on the merits of this application is closed. However, a determination of the issues relating to questions as to conduct by or on behalf of reissue applicants remains outstanding.

This reissue application is being referred to the Office of the Assistant Commissioner for Patents for further consideration in regard to the question of conduct. Reissue applicants will be sent further communications in due course. M.P.E.P. 2022.03.

V. Hum: tc
703 557 3137
11/5/82

[Signature]
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PRIMARY EXAMINER
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JUN 2 1983

In re Application of
David J. Nutting et al
Serial No. 05/936,784
Filed August 25, 1978
For: PLAYER OPERATED GAME
APPARATUS

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:
:

COMMISSIONER'S OFFICE

REQUIREMENT FOR INFORMATION

The above identified reissue application is before the Office of the Assistant Commissioner for Patents for "duty of disclosure" review pursuant to Section 2030 of the Manual of Patent Examining Procedure.

REVIEW OF FACTS

1. This application was filed August 25, 1978 to obtain reexamination by reissue of U.S. Patent No. 4,093,232 under 37 CFR 1.175(a)(4).
2. U.S. Patent No. 4,093,232, issued June 6, 1978, is directed to a player operated game apparatus, more particularly a pinball machine, having a programmed memory processor operatively connected to control the operation of the machine. The processor activates lights and other responses in response to signaling means. The processor is connected to the various signaling means, lights and other responses by the same matrixing or multiplexing means. (Col. 2, lines 19-27; column 6, lines 8-30) Provision is made to prevent adverse effect of electrical noise on the operation of the memory processor (Col 4 lines 1-3; col. 7, line 47).
3. A reissue declaration accompanying the application advises that Bally Manufacturing Co., assignee, seeks review of the patent claims in the light of certain references including, inter alia,
 - (a) "MCS-4 Micro Computer Set Users Manual" Intel Corp. January, 1972
4. On December 29, 1978, D. Gottlieb & Co. (Gottlieb) and Williams Electronics (Williams) advised the PTO of their intent to file a protest against the reissue application. (See Paper No. 3)

Protestors advised that the patent sought to be reissued was the basis of a lawsuit involving applicant (Bally) and protestors Gottlieb and Williams filed in the United States District Court for the Northern District of Illinois (Bally Mfg. Co. v D. Gottlieb & Co. and Williams Electronics Inc., Civil Action No. 78C2246). The letter advised that protestors intended to allege a breach of the duty of disclosure by applicant.

5. On January 11, 1979, applicant (Bally) filed a letter (Paper No. 4) advising the PTO of the lawsuit. Applicant's letter noted the lawsuit and allegations of violation of the duty of disclosure by protestors. The letter provided copies of the references mentioned in the original Reissue Declaration and noted that protestor Williams had argued that while applicant's present counsel did not prepare and file the original application, present counsel had taken over prosecution of the original application on or about May 31, 1977. Counsel's takeover of prosecution was pursuant to an assignment of rights to Bally Corp. Counsel actively prosecuted the application with amendments and interviews to the close of prosecution on December 22, 1977. Counsel delayed until January 24 and 25, 1978 (after a formal Notice of Allowance was mailed) to interview the examiner and advise him of information regarding a bowling game made by Bally Corporation named "Bally Alley."
6. On March 1, 1979 protestors Williams and Gottlieb filed a protest under 37 CFR 1.291. Grounds for protests were asserted as follows:
 - (a) Obviousness under 35 U.S.C. 103 over prior art not previously considered by the examiner, specifically, the Intel MCS Manual, the Bally Alley service manual, and several literature articles suggesting pinball machines as a logical area of expansion of microcomputer usage;
 - (b) Unpatentability by virtue of prior invention in this country by another (35 U.S.C. 102(g)). More specifically, Atari Inc., through its Cyan division was alleged to have developed the invention in the form of a microcomputer controlled El Toro pinball machine by May 17, 1974; and

- (c) "Fraud" and violation of the "Duty of Disclosure" by virtue of submitting as a reference, after the notice of allowance, a "Bally Alley" service manual which had an incomplete description of the "Bally Alley" game.
7. On September 14, 1979, a protest was filed by Rockwell International Corporation ("Rockwell"). As grounds for protest, "Rockwell" asserted:
1. The patented subject matter is obvious under 35 USC 103 in view of references not of record during prosecution.
 - (a) It was obvious to apply a general purpose micro-computer type controller to a pinball machine using the standard techniques taught by Intel, i.e., scanning an input matrix for information, storing the information, and in response to the stored status information, controlling an output display matrix.
 - (b) Prior to May 13, 1975 at least three separate entities, Atari, Ramtek Inc. and Bally Mfg., had replaced hard-wire conventional relay logic with newly developed general purpose microcomputer chip sets.
 - (c) It was obvious to use the multiplexing and computer techniques of the Bally Alley game to control a pinball machine.
 2. The claimed subject matter was anticipated under 35 USC 102(g) in view of the developments of Atari Corp.
8. On September 17, 1979 Game Plan Inc. ("GPI") filed a protest and advised this Office that it, too, was involved in a lawsuit with Bally in the Northern District of Illinois, Civil Action No. 79C713. As grounds for protest, GPI alleged unpatentability (35 USC 103) over the Bally Alley game. GPI provided evidence which was alleged to show that contrary to earlier assertions by Bally, (Paper No. 5) the Bally Alley game did include a "multiplexing means" as defined by Bally.

9. On December 10, 1979, the examiner, after a thorough review of "the new art submitted by all the parties and their comments relating thereto" mailed an Office action commenting on various references cited by protestors and instituting grounds of rejection. Briefly the examiner took the following position:

(a) Several references cited were not material to the claimed subject matter. Such references included

- (1) Electronic Design article of April 12, 1979 (Paper No. 4 Exh. D3)
- (2) Process Instrument and Control Handbook (1957) (Paper No. 4, Exh. D4)
- (3) Motorola Monitor dated December, 1973 (Paper No. 11, Vol. 1, Exh. 10)
- (4) Potential Impact of Microprocessor Technology article of December, 1974 (Paper No. 11, Vol. 1, Exh. 11)
- (5) Minicomputers and Microcomputers (1974) (Paper No. 11, Vol. 1, Exh. 12)
- (6) Electronics, March 21, 1974 (Paper No. 11, Vol. 1, Exh. 6)
- (7) Electronics, July 11, 1974 (Paper No. 11, Vol. 1, Exh. 15)
- (8) "Programmable Logic Controllers - Painless Programming to Replace the Relay Bank" April 1971 (Paper No. 11, Exh. 8.)

(b) The remaining references depicted the state of the art in electronics. Because the majority of these references did not address pinball games specifically, such references were found to have no bearing on the computerized pinball game of the featured claims. Such references included:

- (1) U.S. 3,715,746 - (calculators)
- (2) French 2,038,597 - (general electronics)

(3) Fairchild TTL Applications Handbook (General electronics)

(4) Bally Alley Service Manual (simulated bowling game)

(c) Claims 1-55 were rejected as unpatentable over a conventional pinball machine in view of the Electronics article (March 1, 1973) and the MCS-4 Micro Computer Set Users Manual (MCS-4).

(d) All claims were rejected over the Atari work on grounds of 35 USC 102(a) or 35 USC 102(g) combined with additional art where necessary.

10. The examiner's Office action of December 10, 1979 included comments on questions of patentability proposed by this Office in its decision of August 28, 1979 (Paper No. 7). More specifically, (a) the examiner refused to reject the claims on grounds of unpatentability over the Bally Alley service manual either alone or in combination with prior art, (b) the examiner refused to reject the claims as unpatentable over specific combinations of the references 1-9 set forth in the Protest. While the examiner refused to reject on the specific combination of references suggested, the examiner did combine two of the references 1-9 of the Gottlieb protest and based a rejection thereon. The examiner's reasoning appears to have been based somewhat on protestors' position that the simultaneous development of the invention by at least three separate parties other than applicants was additional evidence indicative of obviousness.

11. On March 3, 1980, applicant filed a 98 page response to the first Office action. On April 2, 3 and 4, 1982, Protestors Williams, Rockwell and Gottlieb, and Game Plan respectively filed responses to the first Office action. On May 15, 1980, applicants filed a reply to the responses of Gottlieb, Williams, Rockwell and Game Plan. For purposes of this decision, this Office need not reiterate the arguments of the parties. It suffices to say the parties left no stone unturned in arguing the merits of their respective positions.

11. On July 11, 1980 the examiner, after a thorough review of the arguments, and after consideration of additional prior art cited by protestors (Budnick et al, U.S. 3,664,037 and Montgomery

et al U.S. 3,765,105) mailed a second Office action. The examiner took the following position:

- (a) The newly cited Budnick and Montgomery references "taken alone or in combination would not have established a prima facie case of obviousness" (Paper No. 46, page 5).
- (b) Several claims were rejected in view of the combined teachings of newly cited references to Saxton et al, Lally et al and Menke et al. The examiner indicated the rejection could be overcome by amending the claims to describe the "mass" as a "surface projectile" and to include a claim limitation that the game apparatus include a surface for supporting the surface projectile.
- (c) The claims were again rejected over a conventional pinball machine in view of the MCS-4 and the independent contemporaneous development by others as evidence of obviousness.
- (d) The examiner withdrew the rejection under 35 USC 102(a). As reasoning therefor, the examiner noted that applicants had proved an earlier date of conception and a reduction to practice of September 26, 1974 which antedated a public use established for Atari's Delta Queen model pinball machine, at Frank's Pizza Parlor, during the period December, 1974 to January, 1975. Thus the Atari work was not publicly known by others before applicants' invention.
- (e) The examiner withdrew the rejection under 35 USC 102(g). In doing so, the examiner noted that Atari had not abandoned, suppressed or concealed the invention but had failed to prove earlier conception and diligence to reduction to practice.
- (f) The examiner again specifically refused to reject the claims as unpatentable over the Bally Alley game. In this regard the examiner commented that despite the allegations of obviousness, Atari, a respected leader in its field, took about four years to develop a satisfactory machine (Paper No. 45, page 15).

On August 18, 1980 applicant responded to the second Office action. Albeit applicant traversed the rejection, it amended the claims as previously suggested by the examiner.

13. On September 26, September 29, October 16, October 20 and October 22, 1980 the parties argued and counterargued their respective positions. On November 24, 1980, after careful consideration of all the arguments, the examiner noted that issues relating to 35 USC 102(a) and 35 USC 102(g) had not been adequately resolved. The examiner set forth his position as follows:
- (a) The claims were rejected on the basis that an early model pinball machine, produced by Atari in May-June (1974) and named El Toro, constituted a reduction to practice of the claimed invention prior to applicants' invention thereof. The examiner recognized that the early model El Toro machine had the computer mechanism external of the game apparatus and connected thereto by external cable. The examiner noted that the claims embraced such a machine and did not require the computer be located inside the housing. Because the El Toro machine was reduced to practice before the critical date of September 26, 1974 and further because the El Toro type computer was installed in the housing of the Delta Queen and disclosed to the public, in Chicago, at the MOA trade show during October-November 1974, the examiner reasoned that suppression, abandonment or concealment under 35 USC 102(g) had not occurred.
 - (b) The examiner suggested that the rejection could be avoided if the claims were amended to require the presence of a housing for the game and to physically locate the computer etc. in the housing.
 - (c) The examiner reasoned that a rejection on ground of 35 USC 102(g)/103 was not appropriate because "the examiner can only conclude that designing a unitary microprocessor based pinball machine may not have been so obvious." The examiner's opinion appears to have been based on the fact that the evidence showed that simultaneous development by others had not occurred in all cases (Paper No. 61, pg. 8, footnote 4) and that Atari had taken 3 to 4 years to develop a product.

- (d) The examiner again refused to reject based on the Bally Alley game. Indeed, the examiner stated, "It is the examiner's desire to finally put to rest any further entreatments by protestors on the application of the Bally Alley teaching."
 - (e) The examiner specifically withdrew previous rejections over prior art on grounds of 35 USC 103 as evidenced by simultaneous invention by others.
 - (f) The examiner did not reject claims 10 and 28.
14. On December 29, 1980 applicants responded to the examiner's rejection. The response amended claim 1 to include mention of the housing and inclusion of the microprocessor, response means and multiplexing means in said housing. Applicants urged that claims 40-55 did not need to be amended to include specific recital of a housing because the term "pinball game" which appeared in these claims "inherently limited" the claims to a self contained unit wherein everything else, "including the control system which is inherently necessary for all pinball games, is within the cabinet." (Paper No. 64, page 19)
15. On December 29 and 30, 1980 Protestors submitted comments to the examiner's Office action of November 29, 1980. Protestors were refused permission to comment on applicants' response to the Office action. (See Paper NO. 68 mailed January 5, 1981.)
16. On January 30, 1982 the examiner mailed an Office action which constituted a final rejection of claims 57 and 59 (which had not been amended to include the housing feature.) The examiner specifically withdrew the rejection of claims 1-56, 58, and 60-62. The examiner took positions as follows:
- (a) Inclusion of the descriptive word "pinball" in claims 40-55 was to be construed as limiting the claims to a self contained and unitary structure housing the pinball and microprocessor control functions. The examiner construed this as an "implied" limitation. (Paper No. 69, Page 5)
 - (b) The evidence did not support the obviousness of converting the non-unitary El Toro machine to a "self contained unit" (Paper No. 69, Page 5). In this regard the examiner noted that Atari's attempt to convert the non-unitary El Toro to the unitary Delta Queen was unsuccessful. Further

substantial changes were made to Atari's hardware and software designs when Atari began development of the Williams' Superflite machine. (Paper No. 69, Page 6)

- (c) The examiner's Office action evidenced some confusion as to (1) whether the El Toro and/or Delta Queen models were displayed at the MOA trade show, and (2) whether the El Toro embodiment constituted a reduction to practice. (It appears the examiner attempted to set up a hypothetical situation without accurately setting forth the hypothetical facts.)

17. On February 6, 1981 applicants cancelled claims 57 and 59 without prejudice and on February 11, 1981 the examiner indicated allowability of the remaining claims and remanded the application to this Office for duty of disclosure review. A Decision Setting Period for Further Comments was mailed by this Office on February 23, 1981.
18. On February 23, 1981 protestors Gottlieb and Rockwell petitioned the Commissioner of Patents to exercise his supervisory authority and review the merits of the subject reissue application. The petition noted that the Commissioner need only review the following matters of law and uncontroverted fact:
- (1) The Examiner has erred in law in allowing claims over anticipatory prior art based solely upon limitations which the Examiner found as implied in the claims based upon self-serving allegations.
 - (2) The Examiner has erred as a matter of law in finding that it was unobvious without more to place a prior art solid state pinball controller inside the housing of a conventional pinball game.
 - (3) The Examiner failed to follow 37 CFR §1.291 by failing to consider prior art timely submitted by Protestors, and by refusing to allow Protestors a meaningful opportunity to respond after the Examiner completely changed the focus of patentability to new, non-addressed issues.
 - (4) The Examiner has steadfastly persisted in an erroneous finding which is central to his non-obviousness analysis. The Examiner erroneously found that the DELTA QUEEN

computerized pinball game was not present at a 1974 trade show; the Examiner persists in asserting that the DELTA QUEEN was not developed until years later.

19. On March 18, 1981 the Acting Director of Group 330 decided that protestors may have been denied the full time period to respond to the final rejection of January 30, 1981 and requested the examiner to "consider the papers filed by the parties and the issues raised therein ... state his position on the issues."
20. On April 15, 1981, the examiner, after a thorough review of the arguments of the parties, mailed an Office action taking, inter alia, the following positions:
 - (a) Genuine issues of material fact remain unresolved and prosecution was being reopened to consider the issues.
 - (b) Claims 40-55 which described a "pinball" machine were rejected as anticipated, 35 USC 102(g), by the Atari El Toro game because the term "pinball" did not limit the claim to a unitary structure.
 - (c) All claims were rejected as obvious over the El Toro game in view of Saxton on the theory that it would have been obvious to implant the microprocessor controller in the cabinet. The Fairchild Semi-Conductor manual was included as additional art to teach specific limitations included in claims 9, 10, 28, 29, 44, 48, 49, 56, and 58.
 - (d) The examiner indicated that the Burnside Patent No. 2,864,619 "would not appear to have any affect on the §102 and §103 issues."
 - (e) The examiner indicated that the Bally Circus Queen Manual (an undated publication) lacked "the requisite showing to anticipate or render obvious the limitations recited in the claims."
 - (f) A factual inquiry was necessary before the question of obviousness could be determined.
21. On June 4, 1981 applicants filed a response to the examiner's sixth Office action. The response added new claims which in effect rewrote claims 1-29 and 31-39 to remove the "self

contained" feature. The response also took the following positions:

- (a) The Atari El Toro work was not prior art to the claimed invention by reason of prior invention by applicants.
 - (b) The Atari El Toro was not prior art because it was derived from applicants through Dr. Tai, a technical employee of Intel Inc.
 - (c) The Atari El Toro did not constitute a reduction to practice because of inherent electrical noise problems such that the El Toro did not operate under service conditions and did not demonstrate practical efficiency. Applicants proposed the rhetorical question, "If those noise problems could have been so readily cured, why did Atari continue to have those problems occur in the Delta Queen phase, as well as in the subsequent Super Flite phase?" (Paper No. 88, page 35)
 - (d) The Atari open house at which the El Toro was displayed was not public and, accordingly, the El Toro machine was not prior art for purposes of a 35 USC 102(g)/103 rejection.
 - (e) Applicants swore behind the June 24, 1974 filing date of the Saxton reference.
22. On June 25, 1981 protestors Rockwell and Gottlieb filed a reply to applicants' response. Protestors reply presented their position on the issues. In particular, protestors noted that applicants had not proven conception and diligence and had not effectively sworn behind the Saxon reference.
23. On February 12, 1982 the examiner, after a review of "the multitude of papers" filed after the examiner's sixth Office action, mailed an Office action which again rejected all the claims. The examiner set forth the following issues to be resolved:
1. Was conception of Reissue applicants' invention prior to the Atari/Cyan open house?
 2. Was there diligence by Reissue applicant from conception through reduction to practice?

3. If either of the above two issues is lacking, did the Atari/Cyan open house showing constitute (public) use or knowledge under 35 USC 102(a)?
4. Would any differences between the open house device as opposed to the instant invention have been obvious and overcome by the ordinary person in this art under 35 USC 103?
5. Did the Atari/Cyan open house, referred to above, constitute the invention by another, before the reissue applicants' invention thereof, which was not abandoned, suppressed or concealed under 35 USC 102(g)?
6. If differences existed between the open house device and the instant invention, would such differences have been obvious to the ordinary artisan under 35 USC 102(g)/103?
7. Would the issue of simultaneous inventions as an indication of the level of ordinary skill, have been a factor in issues 4 and 4,[sic] supra?

The examiner resolved these issues as follows:

1. The invention was conceived in late 1973 but the dependent claims which contained additional aspects of the invention such as the triac switch, the lamp voltage ratings, the optical coupling means etc. were not conceived until after the Atari open house (Paper No. 114, page 6).
2. Applicants were not diligent in reducing the invention to practice. Thus applicants have not successfully sworn behind the Atari El Toro work. (Paper No. 114, page 9)
3. The Atari El Toro machine "as shown to and used by members of the public (e.g., the Litton brothers) demonstrated practical utility capable of performing its desired function to obtain its intended result." By this statement the examiner concluded that the Atari El Toro was available as a reference under 35 USC 102(a). Nevertheless, the examiner did indicate that if applicant could prove that the alleged noise problem could not have been corrected absent "inventive faculties" then, possibly, the examiner would concur with applicant but the applicants' conception date would revert to June 1974 at about which time applicants began active work on their machine.

4. The Atari El Toro model pinball machine was available as a reference under 35 USC 102(g) because applicants had not demonstrated clearly and convincingly that the El Toro work and Atari/Cyan open house were confidential or under a secrecy agreement.
5. With regard to obviousness, the examiner concluded that if the Atari/Cyan work on the El Toro model machine is available as prior art, the differences between the claimed subject matter and the El Toro prior art were obvious. Absent the Atari work as prior art, the examiner again refused to reject the claims. It is noted that the examiner took the viewpoint that the use of the microcomputer in a pinball machine was the "mating" of two technologies and the formation of a new hybrid art. The examiner was of the opinion that the magazine articles which suggest the "mating" amount to no more than a suggestion to "try" to mate the technologies without indication of just what is to be modified to accomplish the "mating."
24. On April 15, 1982 applicants filed an amendment and response to the examiner's Office action of February 12, 1982. Applicants' response took the position that (1) the examiner had erred when he indicated that applicant had the burden of proof of showing that the Atari machine was not operable or a secret experiment. (This position was supported by a declaration by Professor Irving Kayton.), and (2) provided additional evidence to show that (a) noise was a problem, (b) the Atari open house was not "open," and (c) the Atari El Toro machine did not constitute a reduction to practice.
25. On April 21, 1982 (Paper No. 120) protestors replied to applicants' amendment and response. Protestors took the position that (a) the additional evidence raised new issues and should not be entered after Final Rejection had been made, (b) Professor Kayton's opinion on burden of proof was no more than a "sworn brief on the law by a patent lawyer," and (c) protestors had met the burden of clear and convincing evidence with respect to the Atari El Toro work and the open house.
26. On May 17, 1982 (Paper No. 122) the examiner suspended prosecution for one month and requested additional information from the parties with regard to the new evidence submitted and the

obviousness issue over prior art other than the Atari El Toro work. All parties responded thereto. Protestor Williams Electronics additionally noted that the new evidence was in the form of ex parte affidavits which were not subject to cross examination. Protestor Williams Electronics urged that inter partes depositions be taken.

27. On November 8, 1982, after consideration of all arguments and evidence submitted by the parties including that submitted with responses, supplemental responses, replies and supplemental replies to the responses, the examiner set forth his decision on patentability as follows:
- (1) The examiner withdrew the rejection on grounds of 35 USC 102(a) or 35 USC 102(a)/103 over the Atari El Toro machine. The examiner decided that non-casual observers at the open house "had a confidential relationship with Cyan [Atari]." The examiner further decided that family visitors and casual visitors were not at Cyan to specifically observe the El Toro pinball machine and would have been unable to "glean the technological complexities from visual impressions to be able to convey to the public the subject device." (Paper No. 145, page 2)
 - (2) The examiner decided the El Toro machine was not reduced to practice for the purposes of a 35 USC 102(g) or 35 USC 102(g)/103 rejection. In this regard the examiner noted that the El Toro machine itself "was susceptible to switches hanging up" and that control of the device had not been accomplished at the time of the Delta Queen model.
 - (3) Based on an analysis of all the evidence presented, the examiner decided the invention was not made obvious by the prior art patents and literature articles of record (e.g. Burnside Patent No. 2,864,619; the MCS-4; the March 21, 1974 Electronics article).
 - (4) The examiner closed prosecution on the case and referred the application to the Office of the Assistant Commissioner for Patents for duty of disclosure review.
28. On January 27, 1983 this Office mailed a Decision setting a period for further comments by the parties on the duty of disclosure issues.

29. On February 17, 1983 protestors Gottlieb, Williams and Rockwell⁷⁻ filed comments. The comments present the following issues for consideration by this Office:
- (a) The claims should not have passed to this Office "in light of the inadequacy of the specification due to the missing software."
 - (b) The case should be referred back to the Group Director under M.P.E.P. 2022.03 to ascertain the materiality of certain prior art in particular:
 - (1) A letter to Bally from George Bronk dated July, 1974.
 - (2) The Bally Circus Bingo Game.
 - (c) Protestors assert that this Office should send out Requirements for Information to complete the record which protestors allege is incomplete because discovery is closed in the Federal Court. More particularly protestors request this Office inquire into:
 - (1) The Bally Microprocessor Slot Machine Development
 - (2) Bally's awareness of the Atari development of microprocessor controlled pinball machines.
 - (3) Bally's allegation of commercial success.
 - (4) Bally's Issue of Industry Skepticism.
 - (d) Protestors allege that Bally's unsuccessful attempt to withhold from the examiner information which Bally considered confidential constituted a violation of the duty of disclosure.
 - (e) Protestors assert that during prosecution of the original patent, Bally had certain information in its possession and withheld said information. More particularly Bally is alleged to have withheld information regarding:

- (1) Atari's solid state games efforts in 1974.
 - (2) The Intel User's Manual.
 - (3) The significance of the Bally Alley game. In this regard protestors assert that the examiner's failure to rely on the Bally Alley game as a primary reference is "clear error" and that Bally has "misled" the examiner into making such clear error.
 - (4) The Burnside Patent U.S. 2,864,619.
 - (5) The Montgomery Patent U.S. 3,765,105.
 - (6) The Budnick et al Patent U.S. 3,664,037.
30. On March 2, 1983 applicants filed a reply to protestors' comments on the duty of disclosure. For the most part, applicants' reply reviewed arguments previously made by applicant and considered by the examiner.
31. On April 1, 1983 this Office made inquiry of the examiner regarding the materiality of the following prior art or other information:
- (1) The Bronk letter to Bally dated July 31, 1974.
 - (2) Burnside U.S. 2,864,619
 - (3) Budnick U.S. 3,664,037
 - (4) Montgomery U.S. 3,765,105
 - (5) The Bally Alley game
 - (6) The Atari El Toro Open House
 - (7) The Atari Delta Queen showing at the 1974 MOA conference.
 - (8) The Bally Circus Bingo Game
 - (9) The teachings of the Intel MCS-40 users manual.

- The inquiry requested an assessment of materiality with regard to (a) the claims as originally filed, and (b) the claims as finally allowed.

On April 7, 1983 the Primary Examiner responded as follows:

- (a) While the Bronk letter may have been of some importance in establishing the state of the art, the letter would not have disclosed any more than that already of record, consequently such teaching would not have been material.
- (b) The Burnside patent (2,864,619) would not have been material. The problems encountered in an electro-mechanically scanned game are not equivalent to those found in the computerized variant since such implementations are infinitely more noise tolerant.
- (c) Budnick et al (3,664,637) and Montgomery (3,765,105) are also electromechanical. The "electronics" disclosed therein are not of the caliber claimed in the subject application and would not have encountered the same problem (not material).
- (d) The Bally Alley game is emphatically not material.
- (e) The Atari/Cyan open house is material but does not materially affect the ultimate conclusion of patentability.
- (f) The Atari Delta Queen is material but only to establish reduction to practice.
- (g) The Bally Circus Queen Manual is not material.
- (h) The MCS-40 Users's Manual is important and material but did not affect the ultimate outcome. This manual was cited by applicants at Col. 8 of the original patent and is the subject of the January, 1975 article in Popular Electronics which is of record in the parent application.

A copy of the response is attached hereto.

32. On April 12, 1983, this Office reviewed the examiner's response and noted it lacked specificity regarding whether "materiality" was being ascertained with regard to the issued claims of Patent No. 4,093,232 or the originally filed claims. A telephone inquiry was made requesting an assessment of materiality of the references with regard to the originally filed claims.

33. On April 13, 1983 the examiner replied as follows:

1. The Bronk letter is not material;
2. Burnside, Patent No. 2,864,619, is not material;
3. Budnick, Patent No. 3,664,037, is not material;
4. Montgomery, Patent No. 3,765,105, is not material;
5. Bally Alley is material;
6. The Atari El Toro open house is material;
7. The Atari Delta Queen is material;
8. The Bally Circus Bingo/Queen manual is not material; and
9. The MCS-40 User's Manual is material.

34. On April 20, 1983, Protestors filed a Petition to Strike the instant reissue application. The petition alleged that Bally had not complied with the duty of candor during the instant prosecution. More specifically protestors assert that Bally has consistently argued that the Atari El Toro and Delta Queen conversions were inoperative because they employed a feature called "two-key rollover." "Two-key rollover" is a feature of the computer program which instructs the microcomputer to ignore simultaneous switch closures. Protestors allege that applicants have argued that the standard system taught by Intel for preventing the adverse effect of stuck switches, i.e., the KBP function, would not work in pinball machines. Yet applicants used just such a feature to offset the effect of stuck switches.

35. On April 29, 1983 applicants responded to protestors' allegations noting that the Atari El Toro machine had switch problems even though it did not use the two-key rollover function. Further, applicants note that the KBP function as taught by the Intel manual would not of itself give satisfactory results in a pinball machine. Rather, applicants had included the KBP function and also rearranged the wiring to provide the satisfactory result.

36. On May 19, 1983 this Office made inquiry of the examiner regarding Protestors' latest discovery. More specifically, this Office asked the examiner the following questions.

- (a) Were you aware during prosecution of the instant application that the Nutting et al program used the KBP function?
- (b) Are applicants' statements regarding use of the KBP function in a pinball machine versus use in a keyboard substantially accurate statements?
- (c) Does the information regarding applicants' use of the KBP function affect your decision on patentability?
- (d) Is the fact that applicants' program employs the KBP instruction material to your examination of the instant reissue application?

37. On May 26, 1983 the examiner replied as follows:

- (a) The examiner was made aware of the KBP function in the Nutting program in the course of reviewing arguments advanced by both parties during prosecution of the instant application.
- (b) The examiner is of the opinion that applicants' statements are substantially correct absent a specific showing to the contrary. General allegations are not persuasive without more.
- (c) Even after consideration of the KBP usage in Nutting's program, the examiner can find no reason to reverse the decision previously found. See reasons infra.
- (d) Nor would such usage have been considered material. See reasons infra.

The examiner reasoned that the KBP function, as taught by the Intel manual simply performs an electronic "jam" upon receiving simultaneous signals in much the same way that keys of a non-electric typewriter "jam" when struck simultaneously. Presumably the "jam" is desirable in keyboard programs because it prevents registration of an undesired character. The examiner noted that while the Nutting device has a

KBP instruction, the program used by Nutting et al instructs the computer to perform in a manner different from that of the MCS-4 KBP instruction suggested for keyboards by Intel.

DISCUSSION

It is apparent that the parties to this reissue proceeding have left no stone unturned in setting forth their respective positions. At the outset it should be noted that this examination proceeding is concerned solely with duty of disclosure problems. Patentability has been decided by the Primary Examiner. Absent clear error, or new evidence uncovered by the duty of disclosure examination, the Primary Examiner's decision on patentability is final. A review of the file history reveals no clear error in the Primary Examiner's decision.

Protestors' initial allegation of violation of the duty of disclosure by applicant centers around applicants' delayed and allegedly incomplete submission of the Bally Alley manual to the examiner.

At the outset it is noted that the examiner considers the Bally Alley device "emphatically not material" to the allowed claims of the patent sought to be reissued. The examiner agreed that the Bally Alley game was material to the initial claims because said claims encompassed "simulated as well as actual surface projected games."

It is apparent that the Bally Alley game is at best of marginal materiality. Nevertheless, if applicants were aware of the reference, applicants had a duty to bring the reference to the attention of the examiner. Applicants clearly complied with the duty. Bally brought the reference to the attention of the examiner in such manner that the examiner considered it.

The Patent and Trademark Office has recognized that during prosecution situations will occur such that references must be belatedly brought to the examiner's attention. While the duty of disclosure requires citation of material references as soon as possible after their discovery, 37 CFR 1.99 permits bringing additional information to the attention of the examiner at any time "prior to issuance of a patent." The Bally Alley reference was brought to the attention of the examiner about 6 months after appointment of new counsel pursuant to a proposed assignment of the patent. There is no evidence of record that this citation was not timely. The reference was discussed in an interview and considered by the examiner. No violation of the duty of disclosure is apparent.

With regard to prior art patents to Burnside (U.S. 2,864,619), Budnick et al (U.S. 3,664,037) and Montgomery (U.S. 3,765,105), the examiner has consistently refused to reject claims on the teachings of the patents. It is the examiner's opinion that the problems encountered in electromechanically scanned games are not equivalent to those found in the computerized variant. In the examiner's opinion, the references are not material.

The examiner appears to have based his decision at least in part on the premise that "designing a unitary microprocessor based pinball machine may not have been so obvious" (Paper No. 61, page 9) because of the difficulties encountered by others in designing a practical machine. The examiner's conclusion appears to be supported by pages 3, 4 and 5 of exhibit A submitted by protestors with Paper No. 152. The exhibit, dated February 25, 1974, shows that at that time, Bally, a manufacturer of electromechanical slot machines, estimated "26 man months" of senior electrical engineering work to develop an electronic slot machine. Development of an electronic pinball machine described as an "electronic type flipper" is considered in the same report as an "advanced," "long term" project.

Because the Burnside, Budnick et al and Montgomery references were not material to the prosecution of the patent sought to be reissued, applicants had no duty to submit the references.

With regard to the letter from George K. Bronk to Mr. Ross B. Sheer of Bally, the examiner had decided that this letter, dated July, 1974, is not material and represents a suggestion "to try" various approaches for replacing electromechanical circuits with solid state counterparts. This is no more than an invitation to commence a development program. Further, protestors have not specifically connected the Bronk letter to anyone at Bally substantively involved in prosecution of the patent sought to be reissued. Accordingly, protestors have failed to establish any duty to submit the Bronk letter to the examiner.

With regard to the Bally Circus Queen Manual, the examiner has reiterated his opinion that this undated manual, even if competent as a reference, would not be important to the prosecution. Accordingly, Bally had no obligation to submit this reference.

The examiner considers the MCS-40 User's Manual to be important and material but notes that the manual was referred to in the body of

the specification and its teachings were described in the January 1975 issue of Popular Science cited and considered during prosecution of the patent sought to be reissued.

One citing a reference to the Patent and Trademark Office has the obligation to ensure that the reference is cited in such a manner that it is brought to the attention of and considered by the examiner. Applicants did bring the reference to the examiner's attention. Indeed, the examiner cited what he considered an equivalent thereof. Nevertheless, the MCS-40 User's Manual was not itself submitted because a copy thereof was not submitted therewith. Revision 42 (dated April, 1975) of the Manual of Patent Examining Procedure was in effect at the time applicants filed and prosecuted the application for the patent sought to be reissued.

Section 707.05(b) of the M.P.E.P., in part reads as follows

"707.05(b) Citation of Prior Art by Applicants [R-41]

This section sets forth positive guidelines for applicants, their attorneys and agents who desire to submit prior art for consideration by the Patent Office.....

(2) Full text copies of the pertinent portions of all such prior art citations or other material relevant to patentability of the claimed invention should be supplied, whether the citation is made in a separate paper or in the specification of the application.

...While the Patent Office will not knowingly ignore any prior art which might anticipate or suggest the claimed invention, no assurance can be given that cited art or other material not submitted in accordance with these guidelines will be considered by the examiner."

It is evident that applicants had an obligation to provide the examiner with a copy of the Intel User's Manual if they wished to comply with the duty of disclosure. This is especially true in this instance because User's Manuals are not patents or standard printed periodicals and are not generally available in the examiner's search files.

There is insufficient evidence of record to determine whether the non-compliance was the result of bad faith or gross negligence. Therefore, a Requirement For Information to obtain the necessary facts regarding the reasons for the non-disclosure is appropriate. Such Requirement is set forth below.

Turning next to the Atari work on development of a microprocessor controlled pinball machine, it is evident that the examiner considers the Atari developments "material" to prosecution of the patent sought to be reissued. Despite considerable discovery, protestors have provided no evidence that those substantively involved in prosecution of the Nutting et al application were aware of the Atari developments and the specific electronic nature thereof.

Admittedly, Mr. Robbins of Bally viewed the Atari Delta Queen pinball machine at the MOA exhibition. There is no evidence, however, that Mr. Robbins was either substantively involved in prosecution of the patent application or aware of the electronic circuitry used to control the machine. Moreover, one viewing a competitor's machine at an exhibition could hardly be expected to make inquiry into the specific technology used by the competitor to achieve the desired result.

There is insufficient evidence of record to show that a violation of the duty of disclosure has occurred with regard to the Atari work.

Protestors have urged this Office to make extensive Requirements for Information to complete the record in this case. In support of this request, protestors urge that they did not receive "all prior art information" during the pre-trial discovery. In particular, protestors seek information regarding:

- (a) The Bally Microprocessor Slot Machine Development,
- (b) The Atari Development in particular "the extent of Bally's awareness of microprocessor controlled pinball machine developed at Atari"
- (c) Bally's allegation of commercial success.

It is not the purpose of a "duty of disclosure" review to complete Protestors' discovery. Absent evidence sufficient to suggest the necessity to seek further information to determine if a violation of the duty of disclosure exists, this Office will not make inquiry.

There is no evidence of record that Bally considered the electronic slot and electronic pinball machine as a unitary inventive concept.

Page 3 of protestor's exhibit A describes an electronic slot project which was not initiated as of February, 1974. Page 4 of the same exhibit describes a separate electronic "flipper" project which is listed under "Novelties." No schedule is given therein other than that it is a "long term project" and an "advanced development."

No connection of the projects is apparent. Accordingly, there is no indication of a violation of the duty of disclosure with regard to providing information regarding Bally's electronic slot machine work. Requirements for Information are not warranted.

The Atari development has been discussed above. There is no evidence that Robbins, who viewed the Atari machine, was aware of the control system used therein. There is no evidence that Robbins was substantively involved in the prosecution of the application sought to be reissued. The evidence or record does not suggest that Robbins was involved to the extent that he had a duty of inquiry relating to the Atari development. Requirements for Information on this point are not warranted.

Bally's allegations of commercial success have been amply discussed in several of the papers presented herein. Protestors' allegations of a lack of commercial success are set forth at page 5 of Paper No. 132 and pages 6-10 of Paper No. 35. The arguments and counter arguments have been fully considered by the examiner. Both sides of the issue and the license agreements have been presented to the examiner. There is no reason to believe that a duty of disclosure violation has taken place. There is no reason to go behind the Stern license agreement which speaks for itself.

It is apparent that of all the allegations regarding duty of disclosure presented by protestors, the only one which merits inquiry by this Office is the failure to submit a copy of the Intel MCS 40 User's Manual. Following is a Requirement for Information with regard to this issue.

REQUIREMENT FOR INFORMATION

A. Questions Directed to Mr. Sawall

1. At page 329 of his deposition, Mr. Fredericksen testified you were given the MCS-40 manual to work with in order to prepare the application. Describe and explain the use to which you put this manual in preparing the Nutting et al application.

2. Prior to filing or during prosecution of application S.N. 576,980, were you aware of the following teachings in the manual:
- (a) page 3-1, col 1, regarding multiplexing,
 - (b) page 3-1, col 2, regarding scanning a keyboard and/or use of the KBP function,
 - (c) page 3-2, col 1, regarding rapid scanning in the multiplexed mode to form a continuous display to the human eye,
 - (d) page 3-2, col 1, regarding high peak driving currents to maintain reasonable brightness in multiplexed display lamps,
 - (e) page 3-8, figure 3-15 regarding a matrixed/multiplexed switch arrangement.

If the answer to any of (a) through (e) is "yes," explain why these specific teachings were not brought to the attention of the examiner during prosecution of the Nutting et al application. If the answer is "no," explain why you were not aware of the teachings therein.

3. Explain why you did not provide the examiner with a copy of the MCS-40 User's Manual during prosecution of the Nutting et al application.

B. Questions Directed to Each of A. Sydney Katz and Jerold P. Schnayer

- 1. Prior to filing the instant reissue application, were you aware of the teachings in the Intel MCS-40 Manual set forth in Requirement No. 2(a) through 2(e) to Mr. Sawall. Describe the circumstances under which you first became aware. Include in your description, the date, how the teachings were brought to your attention, and the reasons why you reviewed the manual.
- 2. If you were aware of any of the teachings set forth in Requirement 2a-2e, above, prior to issue of the Nutting et al patent, explain why you did not bring the users' manual to the attention of the examiner.

3. Provide this Office with copies of all documents, letters memoranda etc., not now of record between (a) Counsel Sawall and applicants, (b) Counsel Katz and/or Schnayer and applicants, (c) between Counsel Sawall and Katz, and (d) between counsel and any other party, which refer to the MCS-40 or MCS-40 User's Manual. Such information may be submitted under the provision of M.P.E.P. 724.02 and need not be provided protestor unless found material by this Office.

TIME FOR RESPONSE

Responses to this Decision and Requirement For Information are due no later than THREE WEEKS from the date of this Requirement. The responses should be hand carried to the Office of the Assistant Commissioner for Patents, Building 3, Room 11A13.

Since this application is a reissue of U.S. Patent No. 4,093,232 which is involved in pending litigation the provisions of 37 CFR 1.136(a) will not apply. However, any request by applicant for an extension(s) of time must comply with the provisions of 37 CFR 1.136(b). Specifically, any such request must be filed on or before the day on which action by the applicant is due.

STATUS OF LITIGATION

Applicant is reminded of his obligation to keep this Office informed of the status of the pending litigation.

CONCLUSION

Protestors' Petition To Strike is held in abeyance pending response hereto. A Requirement for Information has been made.

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Examiner, Office of the
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UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

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Washington, D.C. 20530
AUG 23 1983

COMMISSIONER'S OFFICE

In re Application of
David L. Nutting et al
Serial No. 05/936,784
Filed August 25, 1978
For: PLAYER OPERATED GAME
APPARATUS

:
:
: DECISION REFUSING ACTION
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This application seeks to reissue U.S. Patent No. 4,093,232 and is presently before the Office of the Assistant Commissioner for Patents for consideration and resolution of issues directed to the duty of disclosure as defined at 37 CFR 1.56 and for a petition to strike the instant application filed by protestors on April 20, 1983. Following the closing of prosecution by the examiner on November 8, 1982 this Office mailed a Decision to the parties seeking any further comments re the duty of disclosure issues deemed appropriate, to which the parties responded. On June 2, 1983 a Requirement For Information was communicated to the parties by this Office seeking additional facts from applicant's counsel. A more detailed review of the facts up to and including June 2, 1983 is outlined in the Requirement and will not be repeated here.

Following the mailing of the Requirement, both applicant and protestor have responded thereto. The submissions include applicants' response and supplemental response, protestors' replies to the requirement and replies to applicants' responses and a petition by protestors for an oral hearing.

PTO AUTHORITY FOR CONSIDERATION OF CLAIMS PURSUANT TO 35 USC 131 AND 132

Under 35 USC 6 the Commissioner is authorized to "establish regulations, not inconsistent with law, for the conduct of proceedings in the ... Office." Section 1.56 of Title 37, Code of Federal Regulations (CFR), has been so established and, prior to March 1, 1977, provided in part that

"any application fraudulently filed or in connection with which any fraud is practiced or attempted on the Patent and Trademark Office, may be stricken from the files."

Effective March 1, 1977, Section 1.56 of 37 CFR was revised and included, inter alia, paragraph (d) as follows:

"An application shall be stricken from the files if it is established by clear and convincing evidence that any fraud was practiced

or attempted on the Office in connection with it or that there was any violation of the duty of disclosure through bad faith or gross negligence."

The authority of the Commissioner to strike applications has been long recognized by the Commissioner and the Courts. See, for example, In re Heany, 1911 C.D. 138, 171 O.G. 983 (Commissioner's Decision 1911); Ex parte Mallard, 71 USPQ 294 (Commissioner's Decision 1946); and Norton v. Curtiss, 167 USPQ 532 (CCPA, 1970).

The Court of Customs and Patent Appeals in Norton v. Curtiss, supra, at 542, 543, recognized the authority of the Commissioner to strike an application and indicated that

"any conduct which will prevent the enforcement of a patent after the patent issues should, if discovered earlier, prevent the issuance of the patent." Norton, supra, at 543.

Effective July 1, 1982, 37 CFR 1.56(d) was further revised as noted at Volume 47, No. 97 of the May 19, 1982, Federal Register as follows:

"No patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or gross negligence. The claims in an application shall be rejected if upon examination pursuant to 35 U.S.C. 131 and 132, it is established by clear and convincing evidence (1) that any fraud was practiced or attempted on the Office in connection with the application, or in connection with any previous application upon which the application relies, or (2) that there was any violation of the duty of disclosure through bad faith or gross negligence in connection with the application, or in connection with any previous application upon which the application relies.

As noted at page 21746 of the May 19, 1982 revision, supra,

"While questions of fraud and violations of the duty of disclosure have historically been dealt with by the Commissioner through the mechanism of striking the affected application, there is no statutory requirement that the Commissioner act in that manner. Clearly the Commissioner can choose how, and

by whom, the examination directed by 35 U.S.C. 131 can be made. 35 U.S.C. 132 authorizes a rejection in those circumstances where applicant is not 'entitled to a patent under the law.' The rule change simply modifies the mechanism and procedures which the Commissioner will use where the applicant is not 'entitled to a patent under the law' because of failures to comply with §1.56(d)."

As further set forth in the May 19, 1982, Federal Register, the PTO Board of Appeals will, if an appeal is filed, review any rejection based on the failure to comply with the duty of disclosure (37 CFR 1.56(e)).

Thus, protestor's petition to strike the instant reissue based on the allegations that Bally Manufacturing has not complied with the duty of candor will be treated as a petition to reject pursuant to 35 U.S.C. 131 and 132.

MATERIALITY

37 CFR 1.56(a) states that

A duty of candor and good faith toward the Patent and Trademark Office rests on the inventor, on each attorney or agent who prepares or prosecutes the application and on every other individual who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application. All such individuals have a duty to disclose to the Office information they are aware of which is material to the examination of the application. Such information is material where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent. The duty is commensurate with the degree of involvement in the preparation or prosecution of the application.

As noted in the preamble which accompanied the March 1, 1977 revision of Section 1.56

"the section codifies the existing Office policy on fraud and inequitable conduct, which is believed consistent with the prevailing case law in the federal courts."

(See volume 42, No. 19 of the Federal Register of January 28, 1977 at page 5588.)

That Rule 56 is a codification of the prevailing case law has been approved by the courts. True Temper Corp. v. CF&I Steel Corp., 202 USPQ 412, 419 (CA 10 1979). In the True Temper case, the Court of Appeals at footnote 9 stated that-

"the fact that it was only on March 1, 1977, with the amendment of Patent Office Rule 56, that patent applicants were put under an express obligation by rule to disclose material information, is not dispositive as to plaintiff's duties as an applicant before that date. The amended rule merely represented a codification of existing case law on the obligation of applicants to disclose pertinent information or prior art, or face possible invalidation of the patent once issued."

The CCPA in Norton v. Curtiss, 433 F.2d 779, 167 USPQ 532, 544 (1970), characterized "materiality" as being of "critical concern" and indicated that

"materiality has generally been interpreted to mean that if the Patent Office had been aware of the complete or true facts, the challenged claims would not have been allowed."

This has been referred to as the "but for" test. (See In re Multidistrict Litigation Involving Frost Patent, 540 F.2d 601, 611 (3d Cir. 1976).)

At page 545 however, the court in Norton stated that

"the above test cannot be applied too narrowly if the relationship of confidence and trust between applicants and the Patent Office is to have any real meaning. Findings of materiality should not be limited only to those situations where there can be no dispute that the true facts, if they had been known, would most likely have prevented the allowance of the particular claims at issue or alternatively, would provide a basis for holding those claims invalid."
(Emphasis added).

Additionally, in In re Clark, 187 USPQ 209 (C.C.P.A. 1975) at 213, the Court stated

"[W]e do not agree that applicant could, under the state of the law in 1956 or now, amend claims expressly to avoid a section 102 reference unknown to the examiner and justifiably consider there was no duty to bring that reference to the examiner's attention."

Thus, prior to any resolution of the allegations re the duty of disclosure issues, it is necessary that a determination be made as to the materiality of the information in question.

Bally Manufacturing, the instant reissue applicant, is alleged to have withheld information regarding

- (1) Atari's solid state games efforts in 1974.
- (2) The Intel User's Manuals.
- (3) The significance of the Bally Alley game. In this regard protestors assert that the examiner's failure to rely on the Bally Alley game as a primary reference is "clear error" and that Bally has "misled" the examiner into making such clear error.
- (4) The Burnside Patent U.S. 2,864,619.
- (5) The Montgomery Patent U.S. 3,765,105.
- (6) The Budnick et al Patent U.S. 3,664,037.
- (7) The Bronk letter.

The materiality of the above information is to be determined by the "reasonable examiner" as set forth at 37 CFR 1.56(a), supra. Such a determination has been made as evidenced by the primary examiner's opinions, in response to requests from this Office, in which the examiner stated

- (1) The Bronk letter is not material;
- (2) Burnside, Patent No. 2,864,619, is not material;
- (3) Budnick, Patent No. 3,664,037, is not material;
- (4) Montgomery, Patent No. 3,765,105, is not material;
- (5) Bally Alley is material;
- (6) The Atari El Toro open house is material;

(7) The Atari Delta Queen is material;

(8) The Bally Circus Bingo/Queen manual is not material;
and

(9) The Intel MCS-40 User's Manual is material.
(See examiner's memos of April 7 and 13, 1983 which are included herein).

It is further noted that the primary examiner has considered and discussed the above information at various times throughout the prosecution of this application. There is no reason to believe that the primary examiner's analysis and opinions re the materiality of the information in question are erroneous or unreasonable.

The petition to strike filed by protestors is based on the allegation that applicants have argued that the standard system taught by Intel for preventing the adverse effect of stuck switches, i.e., the KBP function, would not work in pinball machines. Yet, protestors argue, applicants used just such a feature to offset the effect of stuck switches.

DECISION

37 CFR 1.56(b), the last sentence thereof, in discussing the duty of those substantively involved in the preparation and/or prosecution of a patent application, states that

"Such an attorney, agent or inventor has no duty to transmit information [to the PTO] which is not material to the examination of the application."

Thus, applicants and counsel were under no duty to disclose the Bronk letter, Burnside patent, Budnick patent, Montgomery patent and the Bally Circus Bingo Queen Manual to the PTO by reason of their non-materiality. See also the Requirement For Information dated June 2, 1983, page 21 thereof, wherein a discussion and conclusion re the above non-material information appears.

The Requirement For Information also spoke to the Bally Alley, the Atari Delta Queen and the Atari El Toro open house. (See pages 23 and 24 thereof). Although deemed material by the primary examiner, this Office, based on the available evidence of record, has determined that there was no violation of the duty of disclosure re this information. This examiner has again reviewed the record and is in agreement with the conclusions in the Requirement that the evidence is not of such a clear and convincing nature that any action pursuant to 37 CFR 1.56(d) is justified.

This leaves the issues relating to the "KBP function" (set forth in the petition to strike) and the Intel user manuals. This decision will deal with both the Intel MCS-4 and MCS-40 manuals.

KBP Function

With respect to the issue re the KBP function, this Office again requested the primary examiner in a memo dated August 2, 1983 (copy attached) to reconsider his opinion re the KBP function and specifically to see if

"the Examiner's opinion re the KBP function [is] altered in any way in view of the protestors' latest arguments relating thereto."

The examiner was further requested to render his opinion as to the materiality of the KBP function.

In his opinion dated August 9, 1983 (copy attached) the examiner stated that

"In response to both questions, the answer is no-- the examiner's opinion is not altered simply because the KBP function is not material."

In support of his determination as to the non-materiality of the KBP function, the primary examiner went on to state that

"The key issue seems to be whether one of ordinary skill in the art could have resolved the problems of the El Toro and Delta Queen devices or develop the instant invention utilizing only obvious and conventional techniques known in the art. Presumably the KBP function at issue would have constituted such a solution. While the examiner finds merit in the arguments from both parties, it is necessary to consider the state of the art in 1974, the time at which these actions occurred and not from the learned position of the 1980's.

Considering the fact that the microprocessor technology did not come into being until around 1972 and the pinball hybrid application was not until late 1973 through 1974, it is relatively clear that this art was at the neophyte stage. A review of the evidence clearly shows this stage. No matter how seemingly trivial a problem appears to us now, back then (1974) it was not inconceivable that those problems were insurmountable absent further exploration and study (El Toro, Delta Queen) or inventive novelty (applicant's invention).

Only by constant or further experimentation, building up the storehouse of knowledge, would such trivialities become obvious. See examiner's analysis beginning on page 6 of Paper No. 61. Thus Mr. Harmon's testimony as to the applicability and obviousness of the KBP operation is not convincing evidence that one skilled in the art at the time of the acts in question would have been able to resolve the problems of El Torc and Delta Queen or construct the instant invention without more."

Additionally, the examiner referred to his opinion of May 26, 1983 (which was an attachment to the June 2, 1983 Requirement For Information) and to the office action of November 8, 1982 (Paper No. 145 closing prosecution).

Clearly, the primary examiner has specifically reviewed all the information relating to the KBP function on at least two occasions and has concluded that this information would not have been material. This Office has reviewed the primary examiner's conclusion re the KBP function and does not find any clear error or abuse of discretion relating thereto. Therefore, since 37 CFR 1.56(b) places no duty to disclose non-material information to the PTO, this Office need not take any action pursuant to 37 CFR 1.56(d) for the failure to disclose the KBP function. The petition to strike (treated as a petition to reject) is therefore denied.

Intel Users Manuals

The final question remaining involves the Intel manuals, referred to as the MCS-4 and MCS-40 manuals. Specifically, the duty of both applicants and counsel relating thereto. The record is clear that the MCS-40 Manual was cited to the PTO in the specification of the patent herein sought to be reissued. As originally filed, the specification at columns 8 and 9 discussed the use of a sequential logic unit shown in a block diagram as

"a suitable microprocessor 50 such as that manufactured and sold by the Intel Corporation of Santa Barbara, California and particularly identified in their 'Intel MCS-40 User's Manual For Logic Designers' and identified by their number MCS-335A-175/15K, which was published and copyrighted in 1974."

The specification went on to explain the microprocessor in terms of the MCS-40 manual by stating

"as more fully disclosed in the Intel bulletin, the microprocessor 50 includes"

The primary examiner has since found the MCS-40 manual material to the examination as set forth in the opinions of April 7 and April 13, 1983. The issue to be resolved re the MCS-40 manual is applicants' and counsels' failure to provide a copy of the manual to the PTO since such manuals or bulletins are not generally available to the examiner.

The Requirement For Information dated June 2, 1983 sought answers as to this issue. In response thereto, the following facts are noted:

(1) Mr. Sawall prepared the original patent application (herein sought to be reissued).

(2) Sawall received a copy of the MCS-40 manual from Frederiksen, one of the inventors at about the time Sawall prepared the application.

(3) Sawall admits that he read some portions of the manual (this is evidenced by the description in the specification of the specific Intel microprocessor) but has never read the entire manual.

(4) Sawall avers that he was not aware of having read or seen any portion of the MCS-40 manual dealing with (a) multiplexing, (b) the KBP function, (c) rapid scanning in the multiplexed mode, (d) high peak driving currents to maintain reasonable brightness in multiplexed display lamps, and (e) a matrixed/multiplexed switch arrangement.

(5) Sawall did not cite the MCS-40 to the PTO since he felt it was not prior art with respect to the invention and it was merely cited in the specification for background information and additional details with respect to the MCS-40 microcomputer.

(6) Messrs. Katz and Schnayer, present counsel, declare that prior to the filing of the instant reissue they had not seen or read any MCS-40 manual.

Looking at the MCS-4 Manual, it is apparent that such is material by virtue of the primary examiner's reliance thereon in two rejections. See Office actions of December 10, 1979 and July 11, 1980. In each rejection, the MCS-4 was utilized as a secondary reference. Subsequently, the primary examiner withdrew the rejection(s) utilizing the MCS-4 manual. Nonetheless, the MCS-4 manual was material and was not cited to the PTO during the prosecution of the patent herein sought to be reissued. A review of the record (including the responses to the Requirement For Information and the deposition testimony of inventor Frederiksen) indicate the following:

1. Frederiksen was aware of the MCS-4 manual.

2. Frederiksen, in two separate responses, averred that he did not have the early Intel manuals since they were "subsequently replaced" by "newer versions." (see Frederiksen's deposition testimony).

3. Frederiksen was not aware of the teachings now alluded to by protestors. (See Frederiksen's deposition testimony).

4. Sawall, Katz and Schnayer all declare that they were not aware of the MCS-4 manual.

At the outset, two conclusions are evident.

1. Frederiksen complied with his duty of disclosure pursuant to 37 CFR 1.56(a) re the Intel MCS-40 manual when he brought same to the attention of his counsel, Sawall. At that point the duty shifted to Sawall who was representing the inventors. Thus, there is no reason to take any action with respect to Frederiksen pursuant to 37 CFR 1.56(d) as to this issue. In any event, Sawall did cite the MCS-40 to the PTO.

2. Since neither Sawall, Katz or Schnayer were aware of the Intel MCS-4 manual prior to the issuance of the patent herein sought to be reissued, action pursuant to 37 CFR 1.56(d) is not mandated. There is simply no evidence to the contrary that counsel were aware of the MCS-4 manual's existence.

This leaves two questions unresolved:

1. Why did Frederiksen fail to cite the Intel MCS-4 manual to his counsel or to the PTO?, and

2. Why did Sawall fail to provide a copy of the Intel MCS-40 manual to the PTO?

As to Frederiksen's duty re the failure to cite the Intel MCS-4 manual to his counsel or to the Office, it is noted that such action or non-action must be deemed to be negligent. In order to reject the claims pursuant to 37 CFR 1.56(d), the standard of proof must be of a clear and convincing nature. See Norton v. Curtiss, 433 F.2d 779, 167 USPQ 532, 546, 547 (C.C.P.A. 1970) and In re Gabriel, 468 USPQ 468, 470 (Comr. Patents 1978). Frederiksen has testified under oath in his deposition that he was aware of the early Intel MCS-4 manual but that the early manual was replaced by newer versions (presumably the MCS-40) and that Frederiksen has no idea what happened to the early MCS-4 manual. Furthermore, Frederiksen has testified that he does not recall seeing any diagram in the MCS-4 relating to "switches interfaced with the microprocessor by placing them in a matrix."

Frederiksen's testimony was taken in a deposition by Mr. Lynch, one of the counsel representing protestors Gottlieb and Rockwell. There is no other evidence of record or evidence which protestors have provided to the contrary. Frederiksen's action in submitting the "newer version" of the Intel manual (the MCS-40) to his counsel, Sawall, is not unreasonable since Frederiksen has testified that the early manuals (the MCS-4) were replaced and he does not know what happened to such early Intel manuals. Of interest also, is protestors' footnote 7 in "Protestors' Response To Requirement For Information" dated June 24, 1983 (Paper No. 177) to the effect that

"A cursory review of the MCS-40 manuals shows that it contains nearly all the teachings of the prior art MCS-4 manual."

Thus, even assuming arguendo that Frederiksen was aware of the specifics in the MCS-4 manual, the fact remains that he did bring the MCS-40 to Sawall's attention which was in his possession at the time and which protestors admit contained nearly all the teachings of the MCS-4 manual. Accordingly, it is clear that the evidence of record as to Frederiksen's failure to cite the MCS-4 manual does not rise to that level necessary to take any action pursuant to 37 CFR 1.56(d).

As to Sawall's failure to submit a copy of the MCS-40 manual to the examiner, such is deemed to be negligent conduct in view of the MCS-40 manual's materiality. The primary examiner has clearly held the MCS-40 manual to be material information in his opinions of April 7 and 13, 1983. In his declaration filed June 15, 1983 Sawall declares that the

"MCS-40 manual ... [was used] to determine appropriate terminology relating to the MCS-40 micro-computer for use in drafting the patent application."

As noted earlier, the specification of the patent (as drafted by Sawall), herein sought to be reissued, was not limited to merely a citation of the MCS-40 manual but a somewhat extensive description of a "suitable microprocessor." Thus, Sawall's manner of citing the manual cannot be considered as the action of one desiring to hide or mislead the examiner. In any event, the primary examiner could have requested a copy of the MCS-40 manual if he deemed it necessary. Furthermore, Sawall declares he never "read the entire manual" which he received from Frederiksen "at about the time that I prepared the patent application." There simply is no evidence of record to the contrary. Additionally, Sawall states that he did not provide the primary examiner with a copy of the MCS-40 manual because he did not consider it to be a "a prior art document" and "never believed" that he had a duty to provide a copy of it. In this respect, the primary examiner did

not utilize the MCS-40 manual in any rejection during the prosecution of the reissue application but rather applied the earlier MCS-4 manual. When considering all the evidence of record relating to Sawall's failure to provide a copy, it is apparent that the evidence is not "clear and convincing" so as to conclude that a rejection pursuant to 37 CFR 1.56(d) is necessary.

As for any action regarding co-inventor Nutting, there is no evidence of record which would indicate that he was or should have been aware of the information in question re the MCS-4 or MCS-40 manuals to the extent that he had a duty to disclose them to his counsel and/or the PTO. Thus, no action pursuant to 37 CFR 1.56(d) is required as to Nutting.

In reaching the conclusion(s) that the evidence is not of such a nature so as to provide the basis of any action (a rejection) pursuant to 37 CFR 1.56(d), it is noted that over 180 papers have been made of record herein which include innumerable submissions by the protestors re patentability of the claims as well as allegations relating to the conduct of the inventors and their counsel. Additionally, the primary examiner has rendered eight office actions and at least three opinions in which consideration of protestors' allegations and comments were given careful scrutiny. Finally, this Office, as more fully detailed in the Requirement For Information and the instant decision, has carefully reviewed the primary examiner's conclusions as well as the allegations proffered.

DECISION ON PROTESTOR'S REQUEST

In Paper No. 179 submitted July 8, 1983, the protestors have filed a petition to the Commissioner for an oral hearing in this application to

"thoroughly review the misrepresentations, and the clear error caused thereby."

Protestors further note that this is the third request for such an oral hearing.

The instant petition is deemed to be one filed pursuant to 37 CFR 1.182. As such, it must be accompanied by the prescribed fee or authorization that petitioner's deposit account be charged. No such fee or authorization is present herein. In any event, the instant petition is deemed as a request and will be treated herein. The request for an oral hearing is denied. There is no evidence of record that the primary examiner has been misled by any assertions by applicants thereby causing clear error. Protestors have had their opportunity to submit papers herein

and, in view of the voluminous nature of the instant record, have certainly taken advantage of same. To the extent that any error existed in the prosecution herein, such was deemed to have been corrected in view of the decision dated March 18, 1981 wherein the primary examiner subsequently reopened the prosecution. This examiner has reviewed the record and is of the opinion that there is no evidence of clear error or abuse of discretion so as to warrant the necessity of any oral hearing.


DECISION RE CONFIDENTIAL MATERIAL

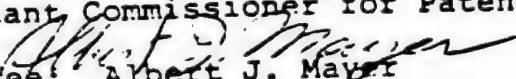
The information submitted pursuant to Section 724.02 of the M.P.E.P. has been considered by this examiner and is not deemed to be material either to the prosecution on the merits or to the Rule 56 consideration. Thus, such information will not be made of record and will be expunged upon the timely submission of an appropriate petition as set forth at Section 724.05 of the M.P.E.P. Any such petition must be filed pursuant to 37 CFR 1.182 and accompanied by the appropriate fee of \$120.

SUMMARY

No action pursuant to 37 CFR 1.56(d) is required.

This application is being forwarded to the Director of Examining Group 330 for appropriate action.


Manuel A. Antonakas
Examiner, Office of the
Assistant Commissioner for Patents


Conferee: Albert J. Mayer

Attachments: April 7, 1983 Opinion
April 13, 1983 Opinion
August 2, 1983 Memo
August 9, 1983 Opinion

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Serial No. 05/936,784

Page 14

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UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

DATE : April 7, 1983

TO : John T. Goolkasian
Examiner, Office of the A/C for Patents

FROM : Vance Y. Hum *[Signature]*
Primary Examiner, Art Unit 334

VIA : Richard E. Aegerter *[Signature]*
Director, Group 330

SUBJECT : Materiality Issues Re S.N. 05/936,784

In regard to the letter of inquiry dated April 1, 1983 relating to the materiality of certain references and facts, a treatment of each topic appears below.

The question of materiality of the Bronk letter to Bally dated July 31, 1974 has been found not to be material. Firstly, very little information appears in the first two paragraphs describing the hardware configuration. In view of Bronk's brief discussion, the examiner can only conclude that the solid state pinball machine being referenced is directed to TTL, or the equivalent, logic. This would not have been any different from the evidence of record; see e.g. Ramtek's TTL version, etc. And as to the matrixing in paragraphs 3-5, such would have been considered to be sheer speculation bordering on the "obvious to try" approach discussed on pages 15-16 of Paper No. 46 and page 19 of Paper No. 114. A similar argument against the PLA/integrated circuit calculator chip implementation would have been applicable to paragraph 6 of Bronk's letter. In essence, while it may have been of some importance in establishing the state-of-the-art, the Bronk submission would not have disclosed any more than that already of record. Consequently, such teaching would not have been material.

With respect to the Burnside patent (2,864,619), adequate comment has been provided on page 9 of Paper No. 79 and again on page 17 of Paper No. 114. While this teaching would appear to have some relevance, it would not have been material since it does not address the issue of combining microprocessor/computer based electronics to multiplexing of quasi-electromechanical surface projectile games. The problems encountered in an electro-mechanically scanned game are not equivalent to those found in the computerized variant since such implementations are infinitely more noise tolerant.

As in the above evaluation, both Budnik (3,664,037) and Montgomery (3,765,105) are concerned with basically electromechanical, slow acting, noise insensitive systems. The "electronics" disclosed therein are not

of the caliber claimed in the subject reissue application and would not have encountered the type of problems which actually occurred in the computerized machines.

The Bally Alley game which has been discussed at great length and on numerous occasions (page 5 of Paper No. 24, pages 10-12 of Paper No. 61, and page 16 of Paper No. 79) is emphatically not material. Of particular note is the fact that the Yoseloff patent (4,008,893) considered in the original application and in the instant reissue application is virtually the same type of device found in Bally Alley. Figure 5 of Yoseloff shows a matrixed light display of the nature shown in Bally Alley to simulate ball motion in a bowling game as described on pages 2-3 of Bally Alley. The only significant difference between the two systems is that Bally Alley employs a radio link and the computer controller. Moreover, these two games are similar in nature to the Kirschner video game patent (4,026,555). The differences between Kirschner, Bally Alley and Yoseloff are in the computer controller and the substitution of a CRT (Kirschner) display for the discrete lamps of both Bally Alley and Yoseloff. However, in the simulated game art, the interchangeability of CRT and discrete lamp displays are well known; see e.g. Ariano et al (not of record), Patent No. 3,874,669, filed March 26, 1973. Thus, it is clear that Bally Alley is of the same type of device within the scope of Atari/Cyan's expertise and beyond that of the surface projectile discipline.

The Atari/Cyan open house has been found material to the examination process, but upon careful evaluation of all of the evidentiary materials, this showing was not found to materially affect the ultimate conclusion of patentability.

As to the Atari Delta Queen, the showing at the October - November 1974 MOA conference has been held material but only to establish reduction to practice. The examiner is not certain as to the extent of the technical disclosure to those viewing the devices.

Apropos to the Bally Circus Bingo game, the examiner presumes that the Bally Circus Queen Manual was intended. In this regard the examiner has found same to not be material and has indicated the reasons therefor on page 10 of Paper No. 79.

The teachings of the MCS-40 User's Manual would have been important and material but did not affect the ultimate outcome in favor of patentability. Of particular note is the fact that this manual is disclosed in column 8 of the original patent (4,093,232) and the machine described therein is the subject of the January 1975 issue of Popular Electronics cited and considered in the parent application.

In summary:

- ✓ 1. The Bronk letter is not material;
- ✓ 2. Burnside, Patent No. 2,864,619, is not material;

- ✓ 3. Budnick, Patent No. 3,664,037, is not material;
- ✓ 4. Montgomery, Patent No. 3,765,105, is not material;
- ✓ 5. Bally Alley is not material;
- ✓ 6. The Atari El Toro open house is material but overcome by the evidence;
7. The Atari Delta Queen is material but only to the reduction to practice issue;
- ✓ 8. The Bally Circus Bingo game is not material; and
9. The MCS-40 User's Manual is material but overcome by the evidence.

DATE : April 13, 1983

TO : John T. Goolkasian
Examiner, Office of the A/C for Patents

FROM : Vance Y. Hum *HY*
Primary Examiner, Art Unit 334

VIA : Richard E. Aegerter *RA*
Director, Group 330

SUBJECT : Addendum to Materiality Issues
Re S.N. 05/936,784

This communication is responsive to a telephone inquiry from Mr. John T. Goolkasian on April 12, 1983 concerning the materiality of the references and facts enumerated in the letter of inquiry dated April 1, 1983 from the Office of the A/C for Patents. Of particular note is the relevance, if any, of the subject material to the substance of the claims as originally filed in Patent No. 4,093,232. This response is in addition to the presentation forwarded April 7, 1983 and is addressed specifically to the aforementioned issue.

The Bronk letter is not material for essentially the same reasons outlined by the examiner in the previous response (April 7, 1983). The original claims recite specifics of the computer controller not seriously addressed by Bronk. Consequently there is no change in the examiner's position.

Burnside would have been important to the extent that there is disclosed an electromechanical matrixing scheme for use in surface projectile type games (see e.g. original claim 20) but does not disclose the processor electronics. This teaching would not have been material to the claims as originally filed.

Budnick and Montgomery references would not have been material since these two teachings do not involve games of the nature requiring a playing field (original claim 3) such as found in pinball games (original claim 20). Moreover, the computer controller is absent from these teachings. These two showings would not have been any better than that of record and would have been merely cumulative. Accordingly Budnick and Montgomery would not have been material to the claims as originally filed.

The Bally Alley game would have been important to the examination of originally filed claims 1-19 since these claims are sufficiently broad to encompass simulated as well as actual surface projectile

games; not until claims 20-26, are pinball/surface projectile game limitations actually brought out. Therefore, to the extent that the scope of the originally filed claims, i.e. claims 1-19, cover the entire game discipline, Bally Alley would have been material.

The Atari El Toro open house demonstration would have been material to the examination of the originally filed claims, i.e. claims 1-26.

The Atari Delta Queen showing at the 1974 MOA conference would have been material to the examination of the originally filed claims, i.e. claims 1-26.

The Bally Circus Bingo/Queen manual would not be material in view of the fact that being undated is incompetent as a reference.

The teachings of the Intel MCS-40 User's Manual would have been material to the examination of the originally filed claims.

In Summary:

1. The Bronk letter is not material;
2. Burnside, Patent No. 2,864,619, is not material;
3. Budnick, Patent No. 3,664,037, is not material;
4. Montgomery, Patent No. 3,765,105 is not material;
5. Bally Alley is material;
6. The Atari El Toro open house is material;
7. The Atari Delta Queen is material;
8. The Bally Circus Bingo/Queen manual is not material; and
9. The MCS-40 User's Manual is material.



DATE: AUG 2 1983

TO: Richard Aegerter
Director, Examining Group 330

FROM: *Manuel A. Antonakas*
Manuel A. Antonakas
Special Programs Examiner
Office of the A/C for Patents

SUBJECT: Examiner's opinion
re Serial No. 05/936,784

The opinion of the Primary Examiner is requested as to the following:

Is the Examiner's opinion re the KBP function altered in any way in view of the protestor's latest arguments relating thereto?

A response to the above inquiry should also include the Examiner's opinion re the materiality of the KBP function.

The Examiner's written opinion should be returned to the Office of the Assistant Commissioner for Patents no later than c.o.b. August 10, 1983.



UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

DATE : August 9, 1983

TO : Manuel A. Antonakas
Special Programs Examiner
Office of the A/C for Patents

VIA : Richard C. Pinkham *Richard C. Pinkham*
Acting Director, Group 330

FROM : Vance Y. Hum *Vance Y. Hum*
Primary Examiner, Art Unit 334

SUBJECT : Response to Materiality Request re
RE SN 05/936,784

Two questions have been posed to the examiner relating to:

1. the examiner's opinion of the KBP function in view of the latest arguments and evidence; and
2. the materiality of the KBP function.

In response to both questions, the answer is no - the examiner's position is not altered simply because the KBP function is not material.

The key issue seems to be whether one of ordinary skill in the art could have resolved the problems of the El Toro and Delta Queen devices or develop the instant invention utilizing only obvious and conventional techniques known in the art. Presumably the KBP function at issue would have constituted such a solution. While the examiner finds merit in the arguments from both parties, it is necessary to consider the state of the art in 1974, the time at which these actions occurred and not from the learned position of the 1980's.

Considering the fact that the microprocessor technology did not come into being until around 1972 and the pinball hybrid application was not until late 1973 through 1974, it is relatively clear that this art was at the neophyte stage. A review of the evidence clearly shows this stage. No matter how seemingly trivial a problem appears to us now, back then (1974) it was not inconceivable that those problems were insurmountable absent further exploration and study (El Toro, Delta Queen) or inventive novelty (applicant's invention). Only by constant or further experimentation, building up the storehouse of knowledge, would such trivialities become obvious. See examiner's analysis beginning on page 6 of Paper No. 61. Thus Mr. Harmon's testimony as to the applicability and obviousness of the KBP operation is not convincing evidence that one skilled in the art

at the time of the acts in question would have been able to resolve the problems of El Toro and Delta Queen or construct the instant invention without more.

In summary the examiner has found that

1. Mr. Harmon's statements do not overcome the examiner's prior findings in light of the evidentiary record.
2. The KBP function was not material to the outcome of the examiner's final decision. See Paper No. 145 and last memo to the Office of the A/C for Patents dated May 26, 1983.

United States Court of Appeals for the Federal Circuit

JERRY F. CONNELL, GARY F. BURNS
and CONELCO, INC.,

Appellants/Cross-Appellees,

v.

SEARS, ROEBUCK & CO.,
a Corporation,

Appellee/Cross-Appellant.

) Appeals Nos. 83-841/
) 83-842
)
)
)
)
)
)
)
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)

DECIDED: November 23, 1983

Before MARKEY, Chief Judge, SMITH, Circuit Judge, and COWEN,
Senior Circuit Judge.

MARKEY, Chief Judge.

Jerry F. Connell, et al. (Connell), appeals from a judgment notwithstanding the verdict (JNOV) of the United States District Court for the Northern District of Alabama Middle Division holding U.S. Patent No. 3,459,199 (the '199 patent), issued in 1969 for a hair "teasing and unsnarling implement", invalid for obviousness under 35 U.S.C. § 103, and finding noninfringement by certain hair curler devices. Sears, Roebuck and Co. (Sears), cross appeals the judgment that the patent was not unenforceable for fraud, and a denial of costs. We affirm in part, modify in part, and vacate and remand in part.

Background

On March 24, 1981, Connell sued Sears, charging that various hair curlers sold by Sears infringed the '199 patent. Sears denied infringement and counterclaimed for a declaratory

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IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

BALLY MANUFACTURING CORPORATION,

Plaintiff,

v.

D. GOTTLIEB & CO., WILLIAMS
ELECTRONICS, INC. and ROCKWELL
INTERNATIONAL CORPORATION,

Defendants.

and

BALLY MANUFACTURING CORPORATION,

Plaintiff,

v.

GAME PLAN, INCORPORATED,

Defendant.

CIVIL ACTION NO. 78 C 2246

Judge John F. Grady

CIVIL ACTION NO. 79 C 713

PLAINTIFF'S TRIAL BRIEF

I. PROCEEDINGS IN THIS COURT AND IN
THE PATENT OFFICE

This is an action for infringement of U.S. Patent 4,093,232, issued June 6, 1978, to David J. Nutting and Jeffrey E. Frederiksen, and assigned to plaintiff, Bally Manufacturing Corporation. The invention of the patent represents the first practical electronically controlled pinball machine, which ultimately displaced all other types of pinball machines in the market.

On November 15, 1983, the patent was reissued as Reissue Patent Re 31,441. The reissue patent is substituted in this action for the original patent pursuant to 35 U.S.C. § 252, which states that "the reissued patent, to the extent that its claims are identical with the original patent, shall constitute a continuation thereof and have effect continuously from the date of the original patent."^{*/}
The claims asserted here are identical with the original patent.^{**/}

The defendants are Williams Electronics, Inc., D. Gottlieb & Co. and Rockwell International Corporation. Williams and Gottlieb are both major pinball machine manufacturers. These defendants are charged with direct infringement of the patent by making and selling the patented invention within the United States under 35 U.S.C. § 271(a).

^{*/} "§ 252. Effect of reissue.

The surrender of the original patent shall take effect upon the issue of the reissued patent, and every reissued patent shall have the same effect and operation in law, on the trial of actions for causes thereafter arising, as if the same had been originally granted in such amended form, but in so far as the claims of the original and reissued patents are identical, such surrender shall not affect any action then pending nor abate any cause of action then existing, and the reissued patent, to the extent that its claims are identical with the original patent, shall constitute a continuation thereof and have effect continuously from the date of the original patent."

^{**/} Plaintiff is asserting the following as representative claims: 45, 46, 47, 48, 49, 51, 53, 54, 55 and 95. Claim 95 contains the identical language as Claim 16 in the original patent (which was dependent from original Claim 1), but was rewritten in independent form in the reissue patent, and is thus italicized therein.

Rockwell was the manufacturer and supplier of the electronic circuitry for the accused Gottlieb pinball game machines, and is charged with actively inducing infringement under 35 U.S.C. § 271(b) and contributory infringement under 35 U.S.C. § 271(c).

Plaintiff, Bally, the defendants Williams and Gottlieb, and a fourth company, Stern Electronics, Inc., represent all of the major pinball manufacturers in the United States during the relevant time period. Stern is a licensee under the patent in suit and has paid plaintiff more than three quarters of a million dollars in royalties for the use of the invention.

In this action, plaintiff claims that defendants Williams and Gottlieb have sold more than \$400 million dollars worth of electronically controlled pinball machines covered by the patent in suit since June 6, 1978, the date that the patent was granted. Bally, itself, has sold more than \$400 million worth of the patented pinball machines since it was introduced to the market.

This action was filed on the date of issuance of the original patent, June 6, 1978. The application for reissue of the patent was filed on August 25, 1978 to permit the U.S. Patent and Trademark Office (hereinafter "Patent Office") to reexamine the patent in view of various prior art defenses which were asserted by the defendants. The defendants were all active participants in the reissue proceedings, which took over five years to conclude.

At various times during the years those proceedings have been pending, this Court has expressed its desire to have the benefit of the patent examiner's view on the technical relevancy of the various prior art defenses which were being asserted by the defendants. Indeed, the Patent Office undertook an extensive reexamination of the patent and invited submission of facts relating to "prior art" of every form, i.e., patents, publications, reference manuals and testimony and documents reflecting the state of the art during the relevant time periods.

The plaintiff and the defendants were parties to the reissue proceedings and submitted to the Patent Office for consideration more than 100 patents and printed publications, portions of the deposition transcripts of more than 60 witnesses and several thousand documents from the files of plaintiff and various witnesses. Much of these materials and the deposition testimony were obtained by the parties from the pretrial discovery conducted in this action, and this Court has repeatedly opened discovery to permit the parties to obtain further information to be filed with the Patent Office. The Appendix to this Brief, entitled "Deposition Summaries," contains summaries of the deposition excerpts which plaintiff will submit in evidence at trial. The defendants submitted more than 50 briefs over the course of the reissue proceedings in opposition to the grant of the reissue patent.

The examination on the merits of patentability was conducted by Examiner Vance Hum, a technical expert in the electronic game art. His final decision of November 5, 1982, finding the claims to be patentable on their merits, was reviewed and confirmed on two occasions by two special examiners, Messrs. Goolkasian and Antonakas. These special examiners also considered the allegations of the defendants that the plaintiff had committed acts of fraud and other misconduct in connection with the procurement of the original patent and the reissue patent, and found that these allegations were without merit. The decision of June 2 contains a brief summary of the entire reissue proceeding and the various positions taken by the parties and the examiner as to all of the issues raised in the reissue proceedings.

The reissue proceedings are important not only because of their length and extent, they are important because they resulted in the Patent Office's decision to grant the reissue patent. As will be discussed in Section IV infra, the grant of the reissue patent creates a statutory presumption that it is valid. According to recent cases of the Court of Appeals for the Federal Circuit, this presumption can only be overcome by clear and convincing evidence.

II. SUMMARY OF THE FACTS

A. The Inventors

The inventors, David J. Nutting and Jeffrey E. Frederiksen, worked together for a small company called Milwaukee Coin Industries ("MCI") in Milwaukee, Wisconsin,

during the period from October, 1973 through July, 1974. Nutting was a principal, having organized MCI as a corporation in 1972. MCI and its predecessor, Nutting Industries, manufactured various coin-operated electromechanical arcade games, such as shooting and quiz games. MCI went out of business due to financial difficulties in the summer of 1974. Dave Nutting Associates ("DNA") was formed by Nutting and Frederiksen, who continued in the business of designing games in a small portion of an old factory building in Milwaukee. They developed the invention during the period from late 1973 through fall of 1974 while employed by MCI and then with DNA. They filed a patent application on the invention in May, 1975, which issued into the original patent on June 6, 1978.

In 1976, they moved their business to Arlington Heights, Illinois, and became an Illinois corporation, which was acquired by Bally in December, 1977. Bally purchased DNA, including the rights to the invention from Nutting and Frederiksen, for stock valued at over two million dollars. The assignment of the original Nutting and Frederiksen patent application was made from that Illinois corporation to Bally on January 23, 1978.

At the time the invention was developed, Dave Nutting was a designer of electromechanical arcade games and Jeffrey Frederiksen was an electronic technician with experience in electronic technology. Frederiksen's college education included three years of mathematics and physics,

and one year of electrical engineering. For financial reasons, he left college before receiving a degree and entered the armed forces where he received training and work in electronics and computers. After leaving the service, he took additional courses in computer science.

Since 1968, Dave Nutting had wanted to develop a pinball machine because it was a relatively stable type of game, not subject to the erratic fluctuations that he had experienced with the other types of arcade games. However, Nutting knew that to break into the established pinball machine industry, he would have to come up with something significantly different and better than the machines being used by the major pinball machine manufacturers. The pinball machine technology, at that time, used electromechanical logic systems and had been relatively unchanged for over 20 years.

Thus, in November of 1973, Nutting instructed Frederiksen to investigate various designs of electronic systems for replacing the old electromechanical circuitry. In late 1973 and in 1974, Frederiksen, working with Nutting, applied so-called "multiplexing" techniques, with which Frederiksen had become familiar because of his armed forces work with communication systems, to microprocessor semiconductor technology and the pinball art to provide a pinball machine which appeared to operate like the prior electromechanical pinball machines, while, at the same time, achieving economy of manufacture and much greater versatility in game design.

The internal operation and functioning of the new machine were drastically different from the electromechanical machines. The electronic pinball machine employs matrix-multiplexing principles: switches and display elements are electrically connected in a matrix, i.e., in rows and columns, and the matrix is cyclically and sequentially scanned by a microprocessor-based system to sense the playfield switches being hit by the ball and to operate the display elements in response to the switch actuations. At the same time, the solenoid-operated devices are actuated by the microprocessor system in response to the matrix-multiplexed switch sensing. But, such actuation of the solenoids is accomplished without multiplexing. The scanning and processing of information is done at a rate fast enough that the switches appear to the player to be connected directly to each of the displays and solenoid-operated devices as in the old electromechanical relay-controlled pinball machines. This is accomplished according to predetermined game rules in real time.

The technology involved in this case, and the complex nature of the invention, must be understood to appreciate the complex nature of the invention and to evaluate the prior art defenses being asserted by the defendants. They are discussed in Section III of this memorandum, infra, entitled, The Technology.

Nutting and Frederiksen worked continuously on the development of this new pinball machine concept through September, 1974. The invention was reduced to practice by

September 26, 1974. During a portion of this period, they also worked on a quiz game and developed a non-pinball operated game called "Super IQ," using the microprocessor controlled multiplexing system which proved out the concept ultimately used in the pinball games.

Prior to the reduction to practice of the invention, the inventors obtained from Bally two identical conventional electromechanical pinball machines called "Flicker". One of the Flickers was converted so as to incorporate the electronic system of the invention and the other Flicker was used for comparison purposes. Recognizing the harsh electrical noise environment of electromechanical arcade games, the inventors and others conducted tests with respect to the converted Flicker which established that it would perform satisfactorily as a pinball machine in the intended harsh electrical environment.

In DNA's facility at Milwaukee, on September 26, 1974, having completed the reduction to practice by constructing and testing the converted Flicker, the inventors demonstrated the converted Flicker and the conventional unconverted Flicker side-by-side to various people from Bally. The people from Bally included a vice president of engineering, his assistant, and two electronic engineers. The inventors successfully demonstrated that the converted game played substantially the same as the unconverted Flicker.

Bally, although impressed with the demonstration, did not immediately enter into any agreement to acquire the

rights to the invention. Instead, it started its own development project, since it had now been shown the viability of a practical electronic approach as developed by Nutting and Frederiksen.

In early 1975, the inventors offered to negotiate with defendant Gottlieb for disclosure of and the rights to the present invention, but were again rejected. Subsequently, in mid-1975, the inventors entered into an arrangement with a small company in Arizona called Mirco. Under the arrangement, Mirco was to make pinball machines using the invention. Although the inventors submitted certain designs employing the invention to Mirco, some disagreements arose with respect to the design and the terms of the arrangement. As a result, the relationship was terminated. However, Mirco did manufacture some commercial pinball machines which were in part based on the inventors' design.

In early 1976, the Midway subsidiary of Bally entered into an agreement with the inventors for the manufacture of a home type pinball machine incorporating the invention. The games were first sold in approximately August of 1977, and over 12,000 such games were ultimately sold at prices which were substantially lower than that of commercial coin-operated pinball machines. This was made possible by the economy resulting from the use of the invention.

B. Pinball Machine Manufacturers

(1) Bally

The development of the inventors should be contrasted with what had been and what was going on in the pinball machine industry. In particular, in approximately 1972, Bally contracted with engineers from Texas Instruments, including George Bronk, to design an electronically controlled pinball machine. A game called Big Valley was ultimately provided to Bally in 1973. But upon evaluation, the game was rejected and abandoned as unsatisfactory. Also in 1973, Colin Foster, an engineer for Bally designed a microprocessor-controlled simulated bowling game called Bally Alley, which did not have surface projectiles, but had a display of lamps which were used to simulate motion in the game. A small number of these games were built and sold, most of them were returned, and the project turned out to be a failure. The designer's employment terminated and the experience created skepticism at Bally with respect to the further utilization of microprocessor technology in games.

However, after the engineers of Bally examined the converted Flicker pinball machine of Nutting and Frederiksen in Milwaukee, on September 26, 1974, they immediately started on their own project to design a microprocessor controlled pinball machine. The project continued through 1976. During this period of development, Bally acquired DNA and the rights to the patent in suit. The result of the project was Bally's first coin-operated electronically controlled pinball machine,

called "Freedom," which employed the Frederiksen and Nutting invention.

(2) Gottlieb

With respect to defendant Gottlieb, the desirability of designing an electronic pinball machine was first recognized as early as 1972 when a Ph.D. electronics engineer was hired to design an electronic pinball game. He worked on the project for about a year and left the company without having made an acceptable prototype. In October 1974, about a month after a demonstration to Bally, electronic design engineer Allen Edwall was hired by Gottlieb to continue the project to research the use of electronic technology in pinball machines. Edwall did a series of eight different electronic pinball developments, none of which involved microprocessors or the invention, although Edwall had prior experience with microprocessor technology. All of these games were rejected by Gottlieb's management as not being practical electronic pinball machines, and Gottlieb's management expressed its skepticism as to the viability of the electronic approach.

In spite of the skepticism by management, the vice president of engineering, Wayne Neyens, decided to pursue this project. Sometime after Frederiksen offered Gottlieb the invention in early 1975, Gottlieb (now aware that the inventors had a viable electronic pinball machine design using microprocessors and multiplexing technology) started a new project with Edwall using microprocessor technology. Edwall

started this new design after he met with representatives of various microprocessor manufacturers, one of which was already aware of the work of Nutting and Frederiksen.

However, Gottlieb decided that it was not capable of developing such a system in-house, and sought the help of microprocessor companies, including Rockwell International and National Semiconductor. Gottlieb began working with Rockwell to develop its first microprocessor-based commercial electronic pinball machine. It was not completed until late 1977. In the course of this development, Gottlieb shipped a Bally microprocessor-based Freedom pinball machine to Rockwell to show Rockwell what Gottlieb wanted.

Even then, while Gottlieb manufactured its new electronic pinball machines, Gottlieb continued to manufacture electromechanical pinball machines, because it was skeptical of the commercial viability of the electronic pinball machines. After the success of Bally's electronic pinball machines became evident, Gottlieb converted completely to the new system.

(3) Williams

With respect to defendant Williams, a project was started in late 1974 or early 1975 to design an in-house electronic pinball machine. The original design work was done by an electronic design engineer, Ray Macie, who undertook to design the pinball machine using random solid state logic, rather than microprocessors, even though he was familiar with microprocessors prior to starting on the project. In

1975, around the time Macie started working on his project, Mirco's "Spirit of '76" pinball machine which was based on the invention was brought to Williams and analyzed by Macie and other employees. Prior to completion of Macie's design, but after he made some drawings, Williams decided to contact outside sources to attempt to design a microprocessor pinball machine. Williams also attempted to hire programmers or consultants to work on the microprocessor game but was unable to hire any qualified candidates. Work on William's behalf by three outside manufacturers, National, Rockwell and Seeburg, started in the latter part of 1975 and continued through most of 1976. Even at that late date, there were serious problems, and all of the design work was scrapped by Williams, because it was felt to be inadequate for a practical commercial pinball machine.

In October, 1976, Michael Stroll, who had previously worked at National Semiconductor on the project to design the electronic pinball for Williams, became employed with Seeburg, which owned Williams. Upon starting at Seeburg, Stroll undertook to evaluate the National, Rockwell and Seeburg electronic pinball designs. As of January, 1977, Stroll concluded that the work done by these three different manufacturers over a period of about a year was inadequate or impractical to use in commercial pinball machines and decided to attempt another design of a pinball machine in-house. He proceeded to hire a so-called advance development

team which developed the first commercial Williams micro-processor-based pinball machine which was sold at the end of 1977.

At the start of this development, the Williams engineers obtained a pinball machine manufactured by Bally which embodied the invention and a Fireball home pinball machine manufactured by the Bally subsidiary, Midway, which also embodied the invention. Both of these games were obtained with a full set of drawings and were analyzed in detail. In fact, Williams engineers copied various aspects of the system used in the Bally and Midway machines which they then incorporated in their design and which was ultimately used in Williams' commercial electronic pinball machines.

(4) Chicago Coin

The other major pinball company, Chicago Coin, ultimately went bankrupt at the end of 1976 or early 1977 and was acquired by Stern Electronics early in 1977. In 1975, Chicago Coin designed an electronic pinball machine which used random logic instead of microprocessor circuitry. The design engineer used random logic even though he had a computer background and had worked with IBM in the past. The game was never commercially produced and was abandoned. Moreover, his design used random logic even though by 1975 all of the microprocessor manufacturers had visited Chicago Coin to discuss the possibility of using microprocessor technology in an electronic pinball machine.

The people at Chicago Coin expressed skepticism about using the microprocessor technology long after Nutting and Frederiksen had built and demonstrated the Flicker pinball machine embodying their invention to Bally.

After Stern acquired Chicago Coin, Stern copied the commercial Bally microprocessor-based pinball machine system and, in October, 1978, Stern was licensed under the patent in suit. The sale of Stern pinball machines employing the patented invention exploded, making Stern a major competitor in the market.

C. Video Game Manufacturers

(1) Atari

In the beginning of 1974, a project was started at Cyan Engineering, a division of Atari, a well established video game company, to design an electronic pinball machine. The first work done on this project was to make three designs of electronic pinball machines, none of which were based upon microcomputers.

In or about March, 1974, Steven Mayer, an engineer at Cyan Engineering started working on a microprocessor-based pinball machine. The design work at Cyan Engineering went through three distinct stages. The first stage involved work on converting a standard electromechanical El Toro pinball machine to microprocessor control. The second stage involved converting five standard electromechanical Delta Queen pinball machines to microprocessor control. The third stage, which was completed in late 1975, involved converting

a standard electromechanical SuperFlite pinball machine to microprocessor control. The SuperFlite pinball machine was ultimately sent to the main Atari engineering group which examined it and decided to abandon it. The Atari engineering group then did a completely different electronic design. The first microcomputer pinball machine which was ultimately sold by Atari, called the Atarian, used the electronic design of the Atari engineering group and not any of the three stages of design of the Cyan engineering group. Moreover, although the Atarian used a microprocessor-based system in a pinball machine, it did not use the invention of the Nutting and Frederiksen patent. Eventually, in about 1979, Atari went out of the pinball machine business.

When Mayer started working on the microcomputer controlled pinball, he anticipated two problems with the design. First, the microprocessor might not have enough power to provide updating of the displays and checking of the switches. Second, there might be electrostatic noise problems because of the MOS circuitry involved. Mayer's concern about the electrostatic noise problem apparently was based on the fact that Atari had experienced serious electrostatic noise problems in the past with their video games in the field, and the fact that all microprocessors in 1974 were made from MOS parts which were very susceptible to serious malfunction and/or destruction as a result of electrostatic noise.

In designing the microprocessor pinball machine, Mayer took an electromechanical El Toro pinball machine and converted it to microprocessor control. Work done on the El Toro mockup ended in June, 1974. At that time, it looked like an electromechanical El Toro pinball machine, but with a 7-segment LED display rather than the mechanical score reels, and with an umbilical cord or cable extending from the machine which was connected to an external Intellec computer through associated externally located interface circuitry. Both the Intellec and the associated circuitry were located on a table next to the El Toro.

During the development of the El Toro, several tests were performed on it, including a test for susceptibility to electrostatic noise. These tests conclusively showed that the El Toro would malfunction as a result of external electrostatic noise being injected into the machine, and that the malfunction included the computer "bombing", or hanging-up in a nonresponsive state, which caused the play of the machine to stop.

Although the El Toro mockup apparently played without malfunctioning at the Cyan laboratory in 1974, this did not indicate that the El Toro had any immunity to electrostatic noise malfunction, because the laboratory was an environment essentially free of electrostatic noise. In fact, the programmer of the El Toro mockup, Gregory Cox, stated that, although he observed on several occasions internally generated noise problems, he had not observed

problems on any of his projects caused by externally generated noise, such as electrostatic noise.

The noise-free environment was confirmed by Larry Emmons, an electrical design engineer for Cyan Engineering, and was a reason given by him for lack of noise problems when playing the El Toro mockup in the Cyan Engineering laboratory.

The residual and inherent electrostatic noise problems of the El Toro mockup, which, of course, was not a self-contained game, were never solved. When asked what factors of construction he felt caused some of these noise problems, Mayer answered, "Long cables, it wasn't a solid ground, it wasn't laid out on a printed circuit board, so you don't have a good solid reference. It was spread out over a physically diverse space so you couldn't shield the unit." As Mayer stated further, "The problems seemed more in the logic"

Although Mayer speculated that the electrostatic noise problems could be overcome, he did not state specifically how he thought that the problems could be overcome. In fact, during the next stage of the pinball project at Cyan Engineering, when one of the self-contained Delta Queen pinball machines was put out on test location, it was found to be inherently susceptible to electrostatic noise malfunction, and the design was rejected by Cyan Engineering for this reason, among others.

The seriousness of these problems experienced with another Atari game, the Delta Queen, is confirmed by various contemporaneous documents made by Cyan Engineering personnel while working on the pinball project.

On the Delta Queen, the Cyan engineers did not solve the electrostatic noise problem which they had first experienced with the El Toro, even though they had extensive help from applications engineers for Intel, which is the company which manufactured and sold the Intel MCS-4 micro-computer.

The problems and limitations of the Delta Queen project appear to have led Atari to begin to develop the Williams SuperFlite modification as a four player game, using a different control system, architecture and software. The desire was to "use less multiplexing in order to improve reliability and increase serviceability." The reports on the Delta Queen tests "affected our designs in the SuperFlite to go to a lower level of multiplexing of the lights." Robert Jonesi, the professional pinball designer who was hired by Atari in December, 1975, and who was in charge of pinball playfield development on the Atarian until September, 1976, picked up the Superflite prototype from Cyan Engineering and brought it back to the main Atari plant in Los Gatos at the start of the Atarian pinball project for the purpose of seeing the reaction of a ball on a pinball playfield using a solid-state control system. He found that the SuperFlite

did not operate properly and had various problems such as switch problems.

Lack of any reduction to practice of the invention by Cyan is shown by Atari's eventual abandonment in favor of a different system in the Atarian. The documents and testimony of the Atari people showed a general dissatisfaction with the use of a multiplexing system and a desire to reduce the level of multiplexing to avoid problems that they had with the Cyan pinball systems. Because they were not able to obtain reliable or proper functioning, it seems clear that the Atarian engineering group then eliminated the use of matrix multiplexing.

(2) Ramtek

Howell Ivy was an electronic engineer employed by Ramtek and principally involved with the design of video games. He was employed at Ramtek for about a year before the pinball project was assigned to him, which was in the fall of 1974. When the pinball project was assigned to him he was told to make an electronic pinball machine and was not given any information as to the kind of electronics to use. He considered using a solid state discrete logic as opposed to a microprocessor design and he did a paper design for a solid state TTL version of a pinball control system, but it was never implemented. He did this design of a TTL version before actually being assigned to the pinball project and it was prior to September 17, 1974.

When the Ramtek pinball project was initiated, Charles McEwan, the president of Ramtek, asked Gaymond Schultz, another electronic engineer employed by Ramtek, to assist in designing the architecture for the pinball game and Howell Ivy was to do the detail logic design, but they did not know what direction they would go in with respect to the particular system to be used. Later, on or about September 5, 1974, Gaymond Schultz called Ray Holt, a consultant and a friend of his, who had worked with him previously at another company (American Micro Systems). A project team was formed which consisted of the consultant, Ray Holt, Howell Ivy (who was the logic designer) and Gaymond Schultz, who worked with Ivy and Holt on the early parts of the system architecture. The team also included Ken Agard who was a mechanical designer and Robert Jonesi who was an experienced pinball machine designer.

In early September, 1974, discussions were first held between Ray Holt, Charles McEwan, Gaymond Schultz and Howell Ivy concerning the possibility of a pinball game being controlled by a microprocessor. Ray Holt had no prior experience with pinball games.

Based on the deposition testimony of Robert Jonesi, Howell Ivy, Ray Holt and Charles McEwan, Ramtek began working on a microprocessor based pinball machine called Lucky Dice in about September, 1974. In September and October, Jonesi designed the playfield for Lucky Dice. He discussed the rules of the game with Howell Ivy, the electronic engineer,

in October, 1974, and with Holt, the programmer, three or four months later. There was only one playfield and it was finished in about June, 1975.

Lucky Dice was only a mock-up of a pinball machine. It was never completed. It was a cabinet with a playfield and back box connected with a long cable harness to an external computer system and interface logic. It was connected by means of the cable harness to a large circuit card cage or "main frame" containing six (wire wrap) circuit boards and a so-called "test box." It was never built as a self-contained or stand-alone pinball machine. On the one occasion when they tried to place the card cage within the cabinet, the machine would not operate. Jonesi did not consider it a "prototype" or even a "first engineering model," but only a "bench model."

Jonesi first attempted to use the mock-up of Lucky Dice to "play pinball" in June, 1975. The game played badly, it misscored, targets failed to turn lights on or off, it would go into tilt; it would not feed the next ball, the ball remained in the out hole, and there were failures to score in response to hit switches. There were so many "glitches" he could not recall all of them. Although they were reduced, they were never eliminated. He considered these "glitches" to be "very serious" because, "You could never produce the product in the state that it was in." The

mock-up could not properly function as a pinball machine in response to ball action, as distinguished from pushing the switches with your fingers, and sometimes "it would sense [switch closures] when they weren't made."

The game could never be tested for "percentaging" because it would not play consistently enough to determine these figures, although the game was "played many hundreds of times, attempting to get this information." So, the game was "played" in June, July and August, 1975, but never tested. By "played," Jonesi meant that they were able to shoot a ball and see the reaction of the ball on the play-field. Charles McEwan, the president, wanted it to go out on test, "but it couldn't be put out on test, because it didn't work."

Most of the Ramtek employees who played the Lucky Dice mock-up were very unskillful at pinball, and could not judge whether the proper scores were being displayed or other actions were properly occurring.

Jonesi left Ramtek in August of 1975 because, among other things, Ramtek could not build a pinball machine at that time. At Ramtek, the project essentially died and Ramtek never went into the pinball machine business.

Thus, although Ramtek had the incentive to develop a solid state pinball game (because pinball machines had been the "bread and butter product of the whole industry" for thirty years and was a "150 to 250 million dollar industry"), and started work after the applicants' invention had already

been completed, Ramtek was never able to reduce its pinball game to practice. It never completed it beyond the mock-up stage, and merely abandoned it.

McEwan testified that in October, 1975 Ramtek did not have the money to go into production. McEwan showed the Lucky Dice to everyone in the industry including Gottlieb, Williams and Bally, in order to sell or licence the concept. They all rejected it.

Thus, not only do the facts relating to the Ramtek development show that it never resulted in a completed pinball machine or any "reduction to practice", they show that even after the time of applicants' September, 1974 reduction to practice in the Flicker (but before there was a commercial microprocessor-based pinball machine on the market to demonstrate its feasibility and practicality), persons who were in the business of designing and manufacturing pinball machines were skeptical of Ramtek's solid-state microprocessor approach.

III. THE TECHNOLOGY

A. Introduction

The invention is the first practical electronically-controlled pinball machine. It uses a matrix-multiplexing technique for interfacing a microcomputer to the pinball game playfield switch and display elements, while controlling various ball actuating mechanisms in response to the microcomputer in real time, in accordance with predetermined game rules. In order to understand the exact nature of the

invention, it is necessary first to understand a pinball machine and how it must operate, then to understand a micro-computer and how it operates, and finally, to understand matrix-multiplexing.

B. Definition of a Pinball Machine

Exhibit A to this memorandum is a picture of a typical commercial coin-operated pinball machine called "Flicker," which was manufactured and sold by plaintiff during 1974. The Flicker is typical in operation and construction of all pinball machines sold prior to that time. As can be seen in the picture, the Flicker has an inclined playfield mounted in a main cabinet which is commonly called a "coffin". A manual plunger is used to eject a steel ball onto the top of the playfield where, under the influence of gravity, it rolls down the playfield, and it comes in contact with various play features on the surface of the playfield. These play features contain switches, incandescent lamps and solenoids. The Flicker also has a vertical back box containing digital-score reels which display, among other things, the score of the game.

As the ball comes in contact with the various play features, it actuates the playfield switches. These switch actuations are detected by digital relay logic circuitry located inside the coffin and the back box. Following predetermined play rules, the digital circuitry generates electrical signals to activate the various lamps, increment

the score of the digital displays, and/or activate solenoids to propel the ball along the playfield or take other action.

Player-operated pivotally mounted flippers are located at the bottom of the playfield. These flippers allow a player to skillfully propel the ball up the playfield to interact with the various play features to obtain the highest score possible, which is the object of the game.*/

Exhibit B is a diagram of an electrical model of a typical pinball machine such as the Flicker. A typical pinball machine has about 30 to 60 switches, about 20 to 60 incandescent lamps, about 5 to 28 digital displays, and about 10 to 20 solenoids. These devices are all connected to the digital logic circuitry which causes the game to play according to play rules as determined by the digital logic circuitry.

1. Play Features

- a. Thumper Bumper

In order to appreciate the complexities of a pinball machine, it is necessary to understand the various play features and obstacles, and how they operate. One type of play feature commonly contained in typical pinball machines is called a thumper bumper. A thumper bumper is located on the top center area of the Flicker playfield. A detailed cross-sectional view of a thumper bumper assembly and its

*/ In a typical game of pinball a player is usually allowed to play 3 to 5 balls.

associated circuitry, located below the playfield and which causes it to operate, can be seen on page 29-30 of Exhibit C.*/
Referring to the picture on page 30, a thumper bumper operates as follows. When a ball rolling on the playfield contacts the plastic skirt, the skirt is forced down, closing the solenoid switch and the scoring switch, both of which are located below the playfield. When the solenoid switch closes, electrical power is applied to the thumper bumper solenoid causing the plunger of the solenoid to pull in. As the plunger pulls in, the metal flange at the top of the solenoid is forced down, which in turn contacts and propels the ball back along the playfield away from the thumper bumper. To insure proper ball response, the solenoid is actuated only for a predetermined period of time.

When the scoring switch of the thumper bumper assembly is closed, the digital logic circuitry increments the score by a predetermined amount, as determined by the play rules of the game. For the thumper bumper on the Flicker the score is incremented by 100 points. The operation of the digital logic circuitry will be discussed later.

b. Rollover Wire

Another type of play feature, which is commonly contained in pinball machines, is a roll-over wire. For

*/ Exhibit C is a manual entitled "An Introduction to Bally Flipper Games," a manual distributed by plaintiff, Bally Manufacturing Corporation (Bally), describing the operation of electromechanical pinball machines manufactured and sold by Bally.

example, the Flicker contains roll-over wires along the out-of-bounds lanes which are located at the right and left bottom of the playfield. These roll-over wires protrude up from a slot in the playfield and are connected to a switch located under the playfield. When a ball rolls over the wire, the wire is forced down. This actuates the switch which can light a light, or increment the score, as determined by the play rules of the game. Roll-over wires are discussed on page 26 of Exhibit C.

c. Sling Shot

Another type of play feature which is commonly contained on pinball machines is a slingshot, and which is another form of bumper. The Flicker contains slingshots which are located behind the rubber bands just above the flippers on the playfield. The slingshot contains solenoid-operated kickers which are mounted in back of the rubber bands. When a ball rolling along the playfield contacts the rubber band, a switch closes, causing the solenoid to activate. When the solenoid is activated, its plunger is pulled in, causing a kicker arm to propel the ball back onto the playfield away from the rubber band. To insure proper ball response, the solenoid is actuated only for a predetermined period of time. Page 28 of Exhibit C describes the slingshot and shows a picture of a kicker arm, and the solenoid which is located below the playfield.

d. Spinner

Still another type of play feature which is commonly contained on pinball machines is a spinner. On the Flicker, the spinner is located in the central portion of the playfield adjacent to the star which contains "100." The spinner contains a pivotally mounted paddle which is set into rotational motion when contacted by a ball rolling along the playfield. The number of rotations depends upon how hard the ball has hit the paddle. The paddle is connected by a rod to a switch located below the playfield so that the switch is actuated once each time the paddle rotates 360°. On the Flicker, each time the spinner switch is actuated the score is incremented by 100 points, and the 10 lights located on the playfield immediately below the spinner are lit in a predetermined sequence.

2. Play Feature Control

a. In General

As can be seen from the discussion above, the play features of a pinball machine respond according to predetermined play rules. For example, as switches are actuated during the play of a ball certain predictable responses occur, such as score increases, and/or lamps or solenoids being activated. The pinball machine operates this way because of the digital logic circuitry located inside the coffin under the playfield, and inside the back box.

The Flicker pinball machine, which was commercially sold by Bally in 1974, has electromechanical digital logic circuitry, which is similar to the digital logic circuitry contained in all pinball machines manufactured and sold for at least twenty years prior to that time.

Electromechanical digital logic circuitry consists of several electromechanical devices interconnected in a particular way to cause the pinball machine to follow the predetermined play rules. Exhibit B shows the digital logic circuitry in the Flicker.

b. The Relay

A picture of the most basic electromechanical component, a relay, is on Exhibit C on page 16, with a description of its operation on page 15. The relay contains a coil consisting of wire wound around a core. The relay also contains an armature flap connected to a spring which normally pulls the flap away from the coil. When current is passed through the wire of the coil, a magnetic field results which attracts the armature flap to the coil. The relay also contains one or more switches which are opened and closed by the movement of the flap.

As can be seen from Exhibits B, the digital logic circuitry of the Flicker contains a large number of these relays along with electromechanical motor units^{*/} that cause the machine to operate according to the game rules.

^{*/} The operation of electromechanical motor units is described on pages 12-14 and 17-19 of Exhibit C.

One aspect of the invention involves replacing the electromechanical digital logic circuitry with a microcomputer and associated interface circuitry.

C. Definition of a Microcomputer

A microcomputer, sometimes also referred to as a "microprocessor," is a miniature general purpose computer. This means that by changing the computer's instructions, i.e., its program, the specific tasks the computer performs with its current programs can be changed to an entirely different tasks. In effect, the microcomputer becomes a different special purpose machine whenever its program is changed. A microcomputer contains a central processing unit (CPU), a random access memory (RAM), a read only memory (ROM) (in which the program instructions are stored), and input-output (I/O) devices. The CPU is the executing heart of the microcomputer. It can be thought of as a traffic controller for electrical signals which operates according to the computer program stored in the RAM and ROM. Following the computer program, the CPU directs the microcomputer to read input signals into the I/O devices and to generate output signals from the I/O devices. By doing this, the microcomputer can be used to control the operation of various external devices in various ways.

The electrical signals generated to and from the I/O devices of microcomputers are very low level (i.e., weak strength) electrical signals which cannot be used directly to sense switch closures, or to actuate the lamps, digital

displays and solenoids of a pinball machine. Rather, it is necessary to have some type of higher power interface circuitry to amplify these signals.

D. Definition of Matrix-Multiplexing

The patent involves a microprocessor-controlled pinball machine which uses a matrix-multiplexing technique for interfacing (electrically connecting) the microcomputer to the switches, digital displays and/or lamps of the pinball machine. The patent also provides that at the same time, the actuation of the solenoids will be controlled in real time according to the game rules directly by the microcomputer. In other words, according to its computer program and the predetermined game rules, the microprocessor generates electrical signals which are transmitted to the interface circuitry in a particular way, to sense switch closures and to actuate the lamps and digital displays of the pinball machine.

One principle which is discussed in the patent involves electrically interconnecting the incandescent lamps of the pinball machine in a matrix of rows and columns, and using a matrix-multiplexing technique to activate the lamps, under control of the microcomputer, as determined by the game rules defined by the program memory of the microcomputer. The same general principle also applies to the digital display of the pinball machine.

Before describing in detail what this means in regard to light bulbs, it is illustrative to understand how

an incandescent light bulb (or lamp), such as those contained in a common flashlight, operates. Exhibit E shows a picture of a lamp which is electrically connected by two wires to a battery (which is a source of electrical power). The lamp has two terminals. The battery also has two terminals. In order for the lamp to activate, each of its terminals must be connected respectively to the two terminals of the battery. This allows electrical current from the battery to flow through the wires to the bulb, thereby activating the bulb and causing it to light. When one or both terminals of the battery are disconnected from the bulb, current stops flowing and the bulb goes off. Moreover, as shown in Exhibit F, a switch can be interconnected to one of the wires from one terminal of the battery to one terminal of the lamp. When the switch is open, current cannot flow from the battery to the lamp and the lamp is off. When the switch is closed, the battery is connected to the bulb so that current can flow, thereby lighting the lamp.

The lamps may be electrically connected in a matrix of rows and columns. Exhibit G shows four lamps which are connected in a two-column by two-row (2 X 2) matrix. The two vertical lines labeled "column 1" and "column 2" represent two wires which are the two rows of the matrix. The two horizontal lines labeled "ROW 1" and "ROW 2" represent two wires which are the two columns of the matrix. Each of the four lamps labeled "LAMP 1-4", respectively, are electrically connected only to one row and one column of the matrix. In other words, one terminal of the lamps is

electrically connected to a column, and the other terminal is electrically connected to a row. These connections are represented in Figure 2 by dots. The overlapping areas of the rows and columns as represented in Exhibit G are not electrically connected.

In order to light any of the lamps in the matrix, as discussed previously, both terminals of the lamps must be electrically connected to a source of electrical power (such as a battery) so that current can flow through the lamp.

In other words, to light up LAMP 1, column 1 and row 1 must be electrically activated. To light up LAMP 2, column 1 and row 2 must be activated. To light up LAMP 3, column 2 and row 1 must be electrically activated. To light up LAMP 4, column 2 and row 2 must be electrically activated.

To light up LAMPS 1 and 2 at the same time, column 1, row 1 and row 2 must be electrically activated at the same time. Similarly, to light up LAMPS 1 and 3 at the same time, column 1, column 2 and row 1 must be electrically activated at the same time.

While for illustration purposes only four lamps are shown in a 2 X 2 matrix in Exhibit G, the number of rows and columns can be increased to allow for more lamps. For example, a 3 X 3 matrix can accommodate nine lamps, a 4 X 4 matrix can accommodate 16 lamps, and an 8 X 8 matrix can accommodate 64 lamps.

Cyclical and sequential multiplexing means that electrical signals, called column strobes, are cyclically

and sequentially applied to the columns. Referring to Exhibit G, this means that a strobe signal is applied to column 1, then a strobe signal is applied to column 2, then column 1, then column 2, etc. These strobes are generated by the column interface circuitry under the control of the microcomputer. In other words, the microcomputer, according to its computer program, clock, or other associated circuitry, generates electrical output signals which cause the column interface circuitry to generate the desired pattern of strobes.

Using this cyclical and sequential multiplexing to light any particular lamps in the matrix, the appropriate row connected to one terminal of the desired lamp must be electrically activated at the same time that the column strobe is applied to the appropriate column connected to the other terminal of the lamp.

The rows are electrically activated by the row interface circuitry also under control of the microcomputer. In other words, the microcomputer, according to the computer program, generates electrical output signals which cause the row interface circuitry to electrically activate the desired row.

For example, to light LAMP 1 using this technique, the microcomputer has to output the appropriate output signals to electrically activate row 1 at the same time that the column strobe is applied to column 1. If this is repetitively done as the column strobes are applied to column 1, LAMP 1 will flash on and off.

However, if the strobes are applied at a very fast rate, such as 50 or 60 times per second or faster, the lights will appear to the human eye to be continuously activated. If the rate is slower than this, then the bulb will appear to flicker on and off. Therefore, by strobing the lamps at a fast enough rate they could be made to appear to the human eye as being continuously activated, even though they in fact are not.

This technique can be used selectively to light one or all four lamps in the 2 X 2 matrix which all appear to be continuously activated if the strobe rate is high enough. For example, to light LAMPS 1 and 3 so they appear to be lit at the same time, row 1 must be electrically activated both when column 1 is strobed and when column 2 is strobed. To light LAMPS 1 and 2, row 1 and row 2 must be electrically activated both when column 1 is strobed and when column 2 is strobed. All four lamps can be turned on by electrically activating rows 1 and 2 both when column 1 is strobed and when column 2 is strobed.

Thus, the microcomputer can, according to its computer program, selectively light any combination of the lamps in the matrix. Of course, this concept can be expanded to accommodate a matrix having any number of rows and columns.

One advantage of using this technique to selectively activate the lamps of a pinball machine is that it reduces the amount of wire needed to connect the lamps (or other displays) to the microcomputer. To understand the reason for this, it is necessary to understand how a microcomputer

can be used to light a single lamp. Exhibit H shows one technique of how to connect the microcomputer to light a lamp. One terminal of the light bulb is connected to one terminal of a power supply, and the other terminal of the light bulb is connected to the output of an electrical device labeled "Driver". The driver is like an electrical switch. When a small electrical signal is applied to the input of the driver, the driver allows current to flow through it. In Exhibit H, when a small electrical signal is applied to the input of the driver, the driver allows current to flow through it, thereby electrically connecting the power supply to the lamp, which turns it on. When no electrical signal is applied to the input of the driver, the driver is turned off, the power supply is disconnected from the lamp, and the lamp is turned off.

In Exhibit H, one of the outputs of the microprocessor is connected by a wire to the input of the driver. To light the lamp, the microcomputer is programmed to generate an output signal on the wire which is connected to the input of the driver, which causes the lamp to turn on. When the program turns off the output signal on the wire, the lamp turns off.

Using the matrix-multiplexing technique to activate the lamps of a pinball machine greatly reduces the number of drivers and the amount of wire. Essentially, each of the rows and columns in the matrix multiplexing system has a row

or column driver similar to the driver in the above illustration. For example, the column interface circuitry contains a column driver for each column and the row interface circuitry contains a row driver for each row. The inputs of these row and column drivers are all electrically connected to the microcomputer which, by generating selective output signals, controls the row and column drivers.

A typical pinball machine may have 32 lamps which can, for example, be connected in an 8 X 4 matrix. Since there are a total of 8 columns and 4 rows, only 12 drivers are required. If a driver were used for each lamp, that would require 32 drivers. By using the matrix-multiplexing technique, a savings of 20 drivers is realized. Since these drivers are very expensive, a substantial savings is realized in the cost of the system.

Another cost savings is realized by using this sharing of rows and columns. Instead of running two wires from each lamp to the power supply, the wires are electrically interconnected in a matrix which substantially reduces the total amount of wire needed. This is particularly important in a pinball machine which has lamps all over the playfield and in the back box which are physically spaced far apart.

As taught in the patent, this matrix-multiplexing technique can also be used to sense switch closures of the switches of a pinball machine. For illustrative purposes, Exhibit I shows a 2 X 2 matrix of four switches. Each switch is electrically connected to one row and one column

in a manner similar to that as described above for the lamps in Exhibit G. According to the matrix-multiplexing technique, column strobes are cyclically and sequentially generated by the column interface circuitry under microcomputer controller in a manner identical to the technique described for the lamp of Exhibit G. in other words, a column strobe is generated for column 1, then column 2, then column 1, then column 2, etc.

The row interface circuitry is also connected to the microcomputer so that, under microcomputer control, the rows are selectively electrically connected to an input of the microcomputer. In order to determine if switch 1 is closed, while column 1 strobe is applied, the row interface circuitry under control of the microcomputer electrically connects row 1, which is connected to one side of the switch, to an input of the microcomputer. The microcomputer, according to the computer program, checks to see ("senses"), if an electrical signal is present on each of the input lines at the same time that a column strobe is applied to column 1, which is connected to the other side of switch 1. If switch 1 is open (or not closed), then the column strobe will not appear on row 1. If this condition occurs, the microcomputer is programmed to indicate that no switch closure is present.

However, if switch 1 is closed when a column strobe is activated for column 1, then an electrical signal will appear on row 1, and the microcomputer "knows" that switch 1 is closed.

This technique of reading switch closures can be described as strobing the columns of the switch matrix and sensing the rows to see if the strobe signal is present on the rows. If a strobe signal is present on a row, then that indicates a switch closure for the switch connected to that row and column. If a strobe signal is not present, that indicates the switch is open.

An example of how the matrix-multiplexing technique is used to sense switch closures in Exhibit I is as follows. The column interface circuitry under control of the microcomputer cyclically and sequentially generates alternate column strobe on columns 1 and 2. As each column strobe is generated, the row interface circuitry under microcomputer control senses rows 1 and 2. Depending on the column which is strobed and the presence or nonpresence of the strobe signals on the rows, the microcomputer can determine which switch is closed or open.

For example, if only switch 1 is closed, then when the column strobe is applied to column 1, the strobe signal will appear on row 1, but not on row 2. Also, when the column strobe is applied to column 2, the strobe signal will not appear on row 1 or row 2.

If, for example, switch 1 and 4 are closed at the same time, then when column 1 is strobed, the strobe will appear on row 1, and not row 2, and when column 2 is strobed, the strobe will appear on row 2, but not row 1. Thus, by knowing which column is strobed, and whether the strobes

appear on any particular row, the microcomputer identifies which switches are open and which are closed.

Of course, this matrix-multiplexing technique can be used for switches connected in virtually any size matrix. For a 3 x 3 matrix, 9 switches can be used. For a 4 x 4 matrix, 16 switches can be used. For an 8 x 4 matrix, 32 switches can be used. And for an 8 x 8 matrix, 64 switches can be used.

Using this matrix-multiplexing technique to sense switch closures, as with the lamps, greatly reduces the amount of wire needed to connect the switches to the electronics of the system, and reduces the number of electrical components needed to interface the microcomputer to the switches. As with the lamps, this is particularly significant for a pinball machine because of the large number of switches, and the fact that they are located all over the playfield of the pinball machine.

The lamps and switches can be connected in a matrix, which contains the same columns, but different rows. Exhibit J shows a schematic diagram of such a system which has nine switches and nine lamps.

The column interface circuitry, under control of the microcomputer with its associated circuitry, cyclically and sequentially generates column strobes on columns 1, 2 and 3. As these column strobes are generated, the lamp row interface under control of the microcomputer selectively activates the rows connected to the lamps to selectively

activate the lamps as discussed above. Also, the switch row interface under microcomputer control selectively connects the rows connected to the switches, to the microcomputer whereby, depending upon the column which is being strobed and the presence or absence of the signal on any particular row in that column will indicate to the microcomputer which switch in the matrix has been opened or closed.

For example, to activate lamp 1, which has one terminal connected to column 1 and the other terminal connected to row 1, every time that column 1 is actuated, row 1 will be activated thereby illuminating lamp 1. Furthermore, if switch 1 is closed, which is connected to column 1 in row 4, as the strobe signal is applied to column 1, and the rows 4 through 6 are electrically connected to the microcomputer, the microcomputer will sense a strobe signal on row 4, but not rows 5 and 6. Therefore, by electrically connecting the lamps and switches in one or more matrices, each of which separately contains common column drivers, the lamps can be activated and the switches sensed at the same time.

E. Real Time

The fact that the use of a microcomputer in a pinball machine is a real time application of a microcomputer will be discussed at trial. This means that as the ball is propelled about the playfield, the microcomputer, which can only do one thing at a time, must sense ball-actuated playfield switch closures, and (1) process that information and

(2) according to the predetermined play rules, selectively actuate the lamps, update the digital displays, and selectively activate the solenoids so that the game plays as a pinball machine.

For example, every time a ball contacts a slingshot bumper and closes the bumper switch the microcomputer must sense the switch closure. At the same time, according to the programmed game rules, it must update the digital scores, selectively actuate lamps, and send out an electrical signal to activate and deactivate the kicker solenoid so that the ball is kicked away from the bumper and propelled back on the playfield. This must all be done while the ball is still in contact with the slingshot bumper.

In other words, the microcomputer must process information and respond to it fast enough so that the game plays as a pinball machine. In the above example, if the processor could not process the information indicating that the ball had come in contact with and actuated the slingshot bumper switch, and activate the kicker solenoid fast enough so that the kicker propels the ball away from the rubber band while the ball is still in contact with the slingshot bumper, then there is no real time response and the game does not operate as a pinball machine.

F. Electrical Noise

The term "electrical noise" will be used throughout the trial and the following is a detailed explanation of what electrical noise is, what causes electrical noise in a

pinball machine, and specifically, why it is so significant in a microcomputer pinball machine. The successful operation of any electronic system depends upon the occurrence of predictable electrical signal within the electronics. Electrical noise is an unpredictable and unwanted electrical signal which can cause the system to malfunction.

An example of how electrical noise affects the operation of an electronic device is the effect of a hair-dryer on a standard television. When the electronics are operating properly, an undistorted picture appears on the screen. When an electric hair dryer is operated in the vicinity of a television set, distortion occurs in the picture. This occurs because the electric motor of the hair dryer emits spurious electrical noise pulses which couple into the electronics of the television and cause a distorted picture.

All electrical systems contain electrical noise. Whether this is a major problem in the system, depends upon the type of electronic components used, how those components are operated, the methods of interconnecting the electronic components and the environment in which the system is used.

Electrical noise malfunction is a serious problem with a microcomputer-based pinball for the following reasons. First, the microcomputer itself is susceptible to serious malfunction as a result of electrical noise. The reason for this is that a microcomputer is a programmed logic device which, as discussed above, includes CPU, RAM, ROM, and I/O.

The CPU acts as a programmed traffic controller which directs the electrical signals in the microcomputer according to the program stored in the ROM. The CPU performs one instruction at a time and sequences through the instructions of the program. The CPU, RAM, ROM and I/O are interconnected by address and data buses (bundles of wires) which allow the transfer of data in the form of patterns of electrical signals back and forth between these devices. This causes the microcomputer to read electrical signals or data from the input ports of the microcomputer, to process that information, to perform computations on it, and to transfer electrical signals to the output ports of the microcomputer. These input and output ports send and receive electrical signals to and from the interface circuitry which ultimately senses the switch closures and actuates the lamps, solenoids and digital displays according to the programmed game rules. The proper operation of the microcomputer depends upon the microcomputer transferring patterns of data along the address and data buses in a proper sequence. The microcomputer does this at a very fast rate. For example, the Intel MCS 4 microcomputer, which was used by the inventors for the reduction to practice of the invention, perform over 100,000 operations per second. If even a single electrical noise pulse appeared on any of the address and data bus lines, that could cause the microcomputer to misinterpret the program instructions and malfunction. These malfunctions can, for example, include sensing switch closures when they

have not occurred, or can cause the machine to "hang up" in a nonoperative state, commonly called "bombing", thereby causing the whole pinball machine to be nonoperative.

Second, a microcomputer operates with very low level electrical signals compared to the electrical signals necessary to operate the digital displays, solenoids and lamps of the pinball machine. Because the microcomputer operates at such low level electrical signals, very small electrical noise pulses can cause the microcomputer to malfunction.

Third, because of the type of electrical components used in the microcomputer, electrical noise signals can be irreversibly destructive. For example, the Intel MCS 4 microcomputer, used by the inventors, had MOS components (or devices). MOS means metaloxide-semiconductor-device. MOS devices have very thin oxide layers which could easily burn up upon the occurrence of electrical noise pulses. A MOS device which has its metal oxide layer destroyed in this manner cannot be repaired.

There are two types of electrical noise which can occur in any electronic product. One is internally generated electrical noise which occurs as a result of the type electronic components used, how those electronic components are operated, and the method of interconnecting the electronic components. The second type of electrical noise is externally generated noise which can couple into the electronics of a product from the environment in which it is operated.

This depends upon the general environment in which the product is used. The components of a pinball machine and the way they operate create a very harsh internal noise environment. Also, due to the typical environment that pinball machines are operated in, they have a very harsh external electrical noise environment.

(1) Internally Generated Noise of A Pinball Machine

Pinball machines have incandescent lamps, relatively large digital displays, and solenoids, all which require high power electrical signals to activate them. The magnitude of these high power electrical signals are large in comparison to the magnitude of electrical signals present in the microcomputer itself.

Moreover, a pinball machine is characterized by long wires which interconnect the switches, lamps, digital displays and solenoids to the electronics of the system. When high power electrical signals are transmitted through these long wires, to activate the various lamps, digital displays and solenoids, the wires act as transmitting antennas which radiate electrical noise pulses throughout the pinball machine. Electrical noise pulses can be picked up on the long lines used to connect the switches to the electronics, which also act as receiving antennae. These electrical noise pulses that are picked up on the long switch lines can be sensed by the microcomputer and cause it to malfunction.

Moreover, the long lines to the lamps, digital displays and solenoids can radiate electrical noise pulses to the microcomputer itself which can, of course, also cause it to malfunction. As a general rule, the higher the power of an electrical signal on a pair of wires to activate a device (such as a lamp or solenoid), the larger the magnitude of electrical noise signals emitted by the wires. Also longer wires act as better transmitters and receivers of electrical noise signals.

This noise radiation problem is compounded in a system which uses a multiplexing technique for activating either the digital displays and/or lamps because multiplexing requires fast turning on and off of these relatively high powered devices. As a general rule, the faster the power is turned on or turned off, the greater the electrical noise radiated to other parts of the electronics of the system.

Another type of internal electrical noise in a pinball machine is created by the use of large solenoids interspersed about the playfield in close proximity to the switches and the wires connecting the switches to the electronics. These solenoids have large coils of wire wrapped about a hollow core. When a current is passed through them, an electromagnetic field occurs in the core and pulls in a plunger. The electromagnetic field created when these devices are turned on can induce electrical noise pulses on the switch lines, thereby causing the pinball machine to malfunction.

Still another type of unwanted electrical signal which could be considered internal electrical "noise" is created by a phenomena called bounce on switches. When an inexpensive switch, such as those used in pinball machines, is closed, the switch does not immediately make a solid contact. Instead, the blades of the switch bounce together creating a series of electrical pulses which can be sensed by the electronics as multiple switch closures when, in fact, only a single switch closure has occurred.

Other types of internally generated noise signals which can disrupt the operation of a pinball machine will be discussed at trial.

(2) Externally Generated Noise of A Pinball Machine

One of the most common types of externally generated electrical noise which is present in a typical pinball environment is electrostatic discharge. This can occur, for example, when a person walks across a carpet in a dry room. Typically, when a person does this and touches a metal object, a spark from the person is transmitted to the metal object. This electrical spark, while very short in duration, can be very high power.

Pinball machines are typically located in environments where electrostatic discharge to the pinball machine can readily occur. This electrostatic discharge can cause serious disruption of the pinball machine in several ways. For example, it can cause a direct flow of a high power electrical noise signal through the various wires of the

machine, and possibly into the microcomputer. This can cause disruption or even destruction of the electronic components of the microcomputer. Also, the spark can create large amounts of antenna type noise. This noise may radiate to the other wires of the system which may act as receiving antennas, and thereby disrupt the operation of the pinball machine.

Other types of electrical noise found in a typical pinball environment are electrical noise signals which are emitted by devices such as motors or fluorescent bulbs. These electrical noise signals may be picked up by the long wires connecting the switches to the microcomputer, and thereby coupled into the electronics of the pinball.

Still another type of externally generated electrical noise signal may result when the power cord of a pinball machine is plugged into a wall outlet which is also used to power other devices. Electrical noise which comes through the power cord may cause disruption to the operation of the microcomputer.

Other types of externally generated electrical noise will be discussed at the trial.

Although noise problems have extremely serious consequences to microcomputer pinball machines, they do not necessarily impair the functioning of all microcomputer products. For example, in calculators electrical noise is not a serious problem. Calculators are devices which have keyboards for entering data, and digital displays. Generally, electrical noise is not a serious problem in such

devices, even those that use microcomputers. One reason for this is that, compared to pinball machines, calculators have very low power electrical components and relatively short wires interconnecting the parts. Therefore, calculators have very little internally generated noise.

IV. THE REISSUE PATENT MUST BE PRESUMED TO BE VALID

As an affirmative defense to Bally's complaint, defendants have asserted that the patent was improperly issued. The defendants argue that the invention was not patentable under the statute and therefore the patent is invalid.

However, Bally has no obligation to establish the validity of its patent. The defendants bear the burden of establishing non-patentability, because the grant of the reissue patent creates a presumption that the patent is valid. The statute specifically provides that each claim of a patent:

shall be presumed valid independently of the validity of other claims; dependent or multiple dependent claims shall be presumed valid even though dependent upon an invalid claim. The burden of establishing the invalidity of the patent or any claim thereof shall rest on the party asserting such invalidity.

35 U.S.C. § 282.

The United States Court of Appeals for the Federal Circuit has recently explained the operation of the statutory presumption in Stratoflex v. Aeroquip Corp., 713 F.2d 1530 (Fed. Cir. 1983). The presumption requires the trial court

to accept the patent claim as valid and to look to the challenger for proof of invalidity. Stratoflex at 1534.

The party challenging validity not only has the burden of establishing a prima facie case, but has the burden of persuasion. Id. Moreover, the patent challenger may overcome the presumption of validity only by presenting clear and convincing evidence. Connell v. Sears, Roebuck & Co., ____ F.2d ____, Slip op. at 13 (Fed. Cir. Nov. 23, 1983). (The slip opinion is Exhibit N to this brief).

The reissue patent was granted only after a heavily contested proceeding in the Patent Office, including two "appeals" from the Examiner's decision. In reviewing a patent held valid by the Patent Office in a fully contested reissue proceeding, such as this one, another judge of this district has held that "this court will not find contrary to the Patent Office absent a thorough conviction supported by clear and convincing evidence that the Patent Office's decision was erroneous." National Tractor Pullers Association, Inc. v. Watkins, 205 U.S.P.Q. 892, 911 (N.D. Ill. 1980). (Roszkowski, J.).

If the burden is not carried, the trial court may simply state that the challenger failed to carry its burden. It is not necessary that the trial court hold the patent valid. Stratoflex, 713 F.2d at 1534 n.3. Until such time as the defendants produce clear and convincing evidence and sustain the burden of establishing that the patent is invalid, the reissue patent must be presumed valid for purposes of this case.

To sustain its claim of infringement, Bally need show only that the patented invention was made, used or sold without its authority. 35 U.S.C. § 271 (1982).

The Findings in the Patent Office

In the lengthy proceedings before the Patent Office, there have been numerous findings. Key rulings may be found in Examiner Hum's Paper No. 145, dated November 5, 1982 (Exhibit K), the Commissioner's Office Requirement for Information, dated June 2, 1983 (Exhibit L), and the Commissioner's Office Action, dated August 25, 1983 (Exhibit M). In Paper No. 145, Examiner Hum specifically found that the El Toro pinball machine made by the Cyan Engineering Group of Atari, was never actually reduced to practice because the evidence showed that it was susceptible to switches "hanging up" because of electrical noise. This failure was apparently not corrected despite the availability of noise reduction techniques. (Exhibit K at pages 3-4, 8.)

The Examiner found that prior to the Nutting and Frederiksen invention, the possibility of computerized/solid state pinball machines was proposed but that there was skepticism in the pinball industry and no known device of this nature had been developed. (Exhibit K at pages 7-8.) He found the invention to have been reduced to practice by September 26, 1974. (Exhibit K at 6.) Examiner Hum considered the fact that Bally and others had been spurred into activity, once they saw a model of the invention. Id. at

page 8. He also considered both the purchase of the invention by an industry leader, Bally, and the licensing of the invention by a competitor. On the basis of all of the evidence before him, and all of the prior art submitted by the defendants, the Examiner found that the claims avoided the prior art. (Exhibit K at 10.)

In an effort to challenge Examiner Hum's conclusion within the Patent Office, the protestors asserted that prior art not previously considered by the Examiner in the original patent rendered the invention obvious. They made specific reference to the Intel MCS Manual, to the Bally Alley Service Manual, and to literature suggesting pinball machines as a logical area of expansion of microcomputer usage. They also contended that the El Toro was prior to the invention. The protestors' contentions were again rejected. (Exhibit L at 2-3, 20.) The special examiners for the Commissioner of Patents, Goolkasian and Antonakis, reviewed many of the examiner's findings with regard to the materiality of claimed prior art. Many of the prior art references, which did not address pinball games, had been found by the Examiner to have no bearing on the claims. (E.g., Exhibit L at 4, 17-19.) The special examiners found that "a review of the file history reveals no error in the primary examiner's decision." (Exhibit L at 20.)

The special examiners' June 2 Action sought answers to certain limited questions regarding whether the duty to disclose certain prior art had been violated. When those

questions were answered, the special examiners issued their decision refusing action. They rejected the protestors' assertions and refused to reverse the examiner's decision. (Exhibit M.) In partial response to the examiners' earlier inquiry, contained in Exhibit M at page 7, is an excerpt from the letter from Examiner Hum dated August 9, 1983. He made the following statement:

Considering the fact that the microprocessor technology did not come into being until around 1972 and the pinball hybrid application was not until late 1973 through 1974, it is relatively clear that this art was at the neophyte stage. . . . No matter how seemingly trivial a problem appears to us now, back then (1974) it was not inconceivable that those problems were insurmountable absent further exploration and study (El Toro, Delta Queen) or inventive novelty (applicant's invention). . . .

V. THE INVENTION WAS NOT OBVIOUS AT THE TIME OF ITS INVENTION

A. The Statutory Test For Obviousness

To succeed in their claim that the patent is invalid, defendants must show that the invention as a whole was obvious at the time it was made to those who had ordinary skill in the relevant art. The problem and the necessary result might have been well known, but it is the solution, the invention, which must have been obvious. The statute directs the Court when evaluating the question of the obviousness of the invention to focus not on the present but on what would have been obvious at the time the invention was made.

The defendants contend that the invention defined in the reissue patent was not patentable because it was obvious at the time it was created. To evaluate their claim, the court must step back in time to examine the state of the pinball art in 1973 to 1974. An invention is patentable unless obvious to a person of ordinary skill in the relevant field at the time of its creation. 35 U.S.C. § 103 (1982). This statute says an invention is only "obvious":

if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Obviousness is a conclusion of law. Environmental Designs, Ltd. v. Union Oil Co. of California, 713 F.2d 693, 695 (Fed. Cir. 1983). To reach the legal conclusion on a claim of obviousness, the court must make a factual inquiry. The fact determinations which must be made involve: (1) the scope and content of the prior art; (2) the differences between the prior art and the claimed invention; (3) the level of ordinary skill in the pertinent art; and (4) additional evidence, which may serve as indicia of non-obviousness. Environmental Designs, Ltd. v. Union Oil Co. of California, 713 F.2d 693, 695 (Fed. Cir. 1983); Graham v. John Deere Co., 383 U.S. 1, 17 (1966).

(1) The Scope and Content of the Prior Art

The defendants bear the burden of establishing by clear and convincing evidence the existence and the relevancy

of that which they assert to be prior art. Pleatmaster, Inc. v. J. L. Golding Mfg. Co., 240 F.2d 894 (7th Cir. 1957).

The most relevant prior art as listed by the defendants in their notice under 35 U.S.C. § 282 in this case has already been considered by the Patent Office. Moreover, the defendants have cited no art more relevant than the art considered by the Patent Office. None of the cited prior art discloses the complete invention of a computer based pinball device.

If the prior art references revealed separate elements of the invention, even if they had revealed all of the separate elements, which they did not in this case, that fact would not support a ruling of obviousness:

That all elements of an invention may have been old (the normal situation), or some old and some new, or all new, is, however, simply irrelevant. Virtually all inventions are combinations and virtually all are combinations of old elements. A court must consider what the prior art as a whole would have suggested to one skilled in the art.

Environmental Designs, Ltd. v. Union Oil Co. of California, 713 F.2d 693, 698 (Fed. Cir. 1983).

This Court must therefore examine the differences between the pinball art that existed in 1973 and 1974, when Jeffrey Fredriksen and David Nutting first conceived and developed their invention, and the microprocessor-controlled electronic pinball machine which they invented. This Court can consider, as the Patent Office considered, patents that had issued prior to the date the invention was made in

1973/1974 in connection with pinball machines in general, and electronic pinball machines containing microprocessor semiconductor technology in particular. In addition, this court may examine, and must only examine, those publications, reference manuals, testimony and documents reflecting the state of pinball machine technology up until the date of the invention.

(2) Differences Between the Claimed Invention and the Prior Art

Some of the differences between the prior pinball art and the Nutting and Frederiksen invention include:

- 1) the absence of electromechanical logic;
- 2) a microprocessor which has a means for storing the program for the rules of the game, and a memory;
- 3) real time play controlled by the microprocessor;
- 4) matrix-multiplexing controlled by a microprocessor for cyclically and sequentially sensing switch closures and activating the digits and/or lamps;
- 5) microprocessor actuation of solenoids in real time in response to game action;
- 6) successful operation of an electronic pinball machine in the intended environment.
- 7) an electronic pinball machine which was competitive in cost with electromechanical pinball machines.

(3) The Level of Ordinary Skill in the Pertinent Art

In addition to requiring the court to place itself at the time of the invention, the statute requires that the

court place itself in the shoes of one who had ordinary skill in the pinball art at that time. The court may not evaluate alleged obviousness with the benefit of hindsight, nor may it examine the question from a level of experience or intellect exceeding those who were laboring in the relevant field. The defendants bear the burden of showing by clear and convincing evidence that the invention would have been obvious to someone with ordinary skill in the art.

Factors that must be considered to determine the level of "ordinary skill in the art" include (1) the educational level of the inventor of the claimed invention; (2) the types of problems encountered in the art at the relevant time; (3) prior art solutions to those problems; (4) the rapidity with which innovations could be made at the relevant time; (5) the sophistication of pertinent technology at the time in question; and (6) the educational level of active workers in the field. Environmental Design v. Union Oil Co. of California, supra, 713 F.2d at 696. Not all factors may be present in every case. Id.

The court may not consider whether "the claimed invention would have been obvious to it, or to a layman, or to those skilled in remote arts, or to geniuses in the art at hand." Id. at 697. Rather, the invention must have been obvious, as a whole, to a person of ordinary skill in the art reasonably pertinent to the particular problem at the time the invention was made. See, e.g., Environmental Designs, 713 F.2d at 697.

(4) Objective Indicia of Obviousness Or
"Secondary Considerations"

In Graham v. John Deere Co., 383 U.S. 1 (1966), the Supreme Court spoke of the "secondary considerations" which must be evaluated in determining nonobviousness. The Court of Appeals for the Federal Circuit has made it clear in Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1538-39 (Fed. Cir. 1983), that the secondary considerations must always be considered in evaluating a claim of obviousness. The court has noted that

[E]vidence of secondary considerations may often be the most probative and cogent evidence in the record. It may often establish an invention appearing to have been obvious in light of the prior art was not. It is to be considered as part of all the evidence, not just when the decision maker remains in doubt after reviewing the art.

Id. at 1539.

The secondary considerations which show that the invention was not obvious are: (a) long-felt need; (b) attempts and failures; (c) skepticism by the people in the art; (d) commercial success and that others were spurred into copying the invention; and (e) recognition and acceptance of the patent by competitors who take licenses under the patent to avail themselves under the merits of the invention.

Graham v. John Deere Co., 383 U.S. at 17-18; Stratoflex at 1539.

Each of these secondary considerations is present under the facts of this case.

(a) Long felt need

The desirability of an electronic pinball machine was recognized well before Nutting and Frederiksen perfected their design in 1974. Moreover, the desire for the invention did not abate, it continued even after Nutting and Frederiksen first used microprocessor semiconductor technology in pinball machines.

As early as 1972, in order to observe and evaluate the feasibility of new pinball machine technology, Bally contracted with engineers from Texas Instruments, including George Bronk, to design a solid state pinball machine. Similarly, in 1972, Gottlieb hired an electronic engineer with a Ph.D. to design an electronic pinball game.

Nutting and Frederiksen first demonstrated the viability of electronically controlled pinball machines by September, 1974, when they converted the conventional electromechanical "Flicker" pinball machine they had obtained from Bally and incorporated their electronic system. Nutting and Frederiksen performed a series of tests on the converted machine and established that it would perform satisfactorily even under the harsh electrical noise conditions present in the typical pinball environment. This demonstration taught Bally and its competitors that it could actually be done and spurred them to continue their efforts, and increased their desire to respond to the need for new pinball machine technology.

The industry interest was also demonstrated by the fact that immediately after Nutting and Frederiksen's demonstration, Bally started its own development project, proceeding along the lines of the Nutting and Frederiksen approach.

At about the same time, Gottlieb hired Allen Edwall, an electronic design engineer, to research the use of electronic technology in pinball machines. After Gottlieb was offered the invention by Nutting and Frederiksen, Edwall expanded his research in order to design a pinball machine using microprocessor technology for Gottlieb. At this point, Edwall and Gottlieb were aided by various microprocessor companies, including defendant Rockwell International and National Semiconductor. This combined effort did not result in the manufacture of a commercial electronic pinball machine until late in 1977, many years after the invention was made.

Other pinball manufacturers also began to respond to industry needs in 1974 and 1975. For instance, the Mirco Company began to manufacture commercial pinball machines based in part on Nutting and Frederiksen's design. Similarly, defendant Williams, directed Ray Macie, an in-house electronic design engineer, to design an electronically controlled pinball machine. Macie first designed a pinball machine using random logic rather than microprocessors. Then, after examining Mirco's machine, Williams decided to go beyond Macie's preliminary designs, and after determining that they were unable to do it in-house, contracted with three outside manufacturers, National Semiconductor, Rockwell

Industries, and Seeburg Industries, to create a pinball machine incorporating microprocessor technology.

Work on these pinball machine designs continued in 1976, when Bally's own Midway subsidiary entered into an agreement with Nutting and Fredricksen for the manufacture of a "home-type" electronic pinball machine. That same year, Michael Stroll, an engineer whose previous work at National Semiconductor had involved design of Williams' electronic pinball machine, became employed at Seeburg Industries and there put together an entire "advance-development team" which rejected all three prior designs as being impractical, and did not produce the first commercial Williams pinball machine until late in 1977. At around the same time, Chicago Coin, a major pinball manufacturer, also attempted to design an electronic pinball machine of its own, which did not use microprocessor technology.

Throughout the early and mid-1970's, then, all of the major pinball manufacturers were actively involved in the attempt to design and produce a pinball machine incorporating some form of electronic control system; the entire industry expressed the desire to replace conventional electromechanical circuitry with the more advanced and more economical microprocessor technology. Nutting and Frederiksen's invention responded to this long felt but unresolved industry need.

In 1974, Atari/Cyan also began work on a pinball program, as did Ramtek. These video game manufacturers

outside the pinball industry also recognized that there would be a market for an electronic pinball machine.

(b) Attempts and failures

The fact that others working in the same art toward the same goal were unable to achieve that goal, refutes any showing that the invention was obvious. Many attempts were made by pinball manufacturers to design and produce electronic pinball machines. All of these attempts prior to the invention were unsuccessful, as were many attempts made after the invention was known. Therefore, Nutting's and Fredriksen's invention, could not have been obvious.

As the Examiner found: "prior to December of 1973, computerized pinball devices of the nature of the instant invention were not present in the industry." (Exhibit K at 5). The earliest attempt presented to Bally was a failure. The Big Valley pinball game, that had been started in 1972 and provided to Bally in 1973 by Texas Instruments engineers, was rejected.

Other manufacturers were equally frustrated by their unsuccessful efforts. For example, although a Ph.D. electronics engineer, hired by Gottlieb in 1971, worked on the project for an entire year, he left the company without having designed an acceptable prototype for an electronic pinball machine. In 1974, defendant Gottlieb's Allen Edwall created eight different nonmicroprocessor developmental

approaches to the creation of an electronic pinball machine. Not a single one was accepted by Gottlieb's management.

Defendant Williams' in-house engineer completed a paper design for an electronic pinball machine in 1975. Williams then asked outside manufacturers to join the Williams project. But Williams discarded all of the design work in 1976, because it was considered inadequate for practical commercial pinball machines. Only after Williams' engineers copied Bally pinball machine designs did Williams successfully produce its first electronic pinball machine.

The defendants will be unable to provide evidence of any successful design or production of electronic pinball machines prior to the Nutting and Frederiksen invention. In fact, the record will amply demonstrate that although the other pinball manufacturers recognized the need for the improved technology and were most anxious to develop it, all of their own original efforts were failures.

Outside the pinball art, Atari and Ramtek encountered repeated failures, even with the help and encouragement of the leading microprocessor manufacturer, Intel.

(c) Skepticism by people in the art

Both before and even after the Nutting and Frederiksen invention, manufacturers extremely knowledgeable in pinball art, and the pinball industry as a whole, expressed skepticism about the possibility of achieving a commercially viable microprocessor-based pinball machine. In late 1974, Williams' in-house engineer, Ray Macie, although familiar with

microprocessor control, chose to design a pinball machine using random logic control. He must have been skeptical about microprocessor controls.

Meanwhile, at Gottlieb in 1974 and 1975, engineer Allen Edwall was developing a series of eight different approaches to electronic pinball machine control. None of these involved microprocessor technology, even though Edwall had prior experience with such technology. These first attempts were rejected as impractical by Gottlieb management, as were Edwall's subsequent initial in-house efforts to utilize microprocessor control.

Nutting and Frederiksen, themselves, had a great deal of trouble selling their invention to skeptical pinball machine manufacturers.

In March, 1974, engineers at Cyan Engineering, a division of Atari, were skeptical of microprocessor systems because they were susceptible to electrostatic noise and had insufficient computing power to do the job. The Cyan engineers first undertook to design an electronic pinball machine with three different non-microprocessor designs. Mayer and Alcorn, both at Atari, expressed skepticism to Intel's Dr. Tai about the practical use of a microprocessor system in a pinball game.

Dissatisfaction with and skepticism of the microprocessor-control system was also evident at Ramtek in the mid-1970's. In early 1974, after being directed to make an

electronic pinball machine, electronic engineer Howell Ivy first considered a design system using solid state discrete logic rather than microprocessor control. Even later, in September 1974, when the Ramtek pinball project was officially started, the project team, which included several experienced pinball machine designers, expressed doubt both about the technological feasibility and the economic viability of microprocessor control. Their fears were realized in "Lucky Dice," Ramtek's first microprocessor pinball machine. Lucky Dice was not considered to be a "prototype" or even a "first engineering model;" it was just a "bench model" with so many "glitches" that its creators eventually gave up on it.

Ramtek ultimately abandoned this pinball machine project, and never went into the pinball machine manufacturing business. Their skepticism concerning the incorporation of microprocessor control to these games was obviously shared by the pinball industry. Ramtek attempted unsuccessfully to sell or license the Lucky Dice concept to all the pinball manufacturers, including Williams, Gottlieb and Bally. McEwan, president of Ramtek said that each of these manufacturers specifically said that they were skeptical.

In short, there is no evidence that any pinball manufacturers thought that microprocessor technology could be adapted for use in pinball machines prior to the invention. The industry skepticism defeats any possible showing by the defendants that Nutting's and Frederiksen's design

was "obvious" to one ordinarily skilled in the art at the time the invention was made.

(d) Commercial success

The speed and extent of Bally's commercial success in marketing the invention show that the industry was ready, willing, and anxious to use a workable design. The unquestioned commercial success of the electronically controlled pinball machines covered by the patent also shows the novelty of the invention. In a short time after their introduction, electronically controlled pinball machines displaced the old electromechanical machines, and ultimately other electronic machines, including the Atarian.

Since the end of 1976 when Bally introduced its first coin-operated "Freedom" pinball machine using the invention, Bally itself has sold more than \$400 million worth of the patented pinball machines. Moreover, two of Bally's primary competitors, defendants Williams and Gottlieb, have also sold more than \$400 million worth of electronically controlled pinball machines. Eight hundred million dollars in sales is strong evidence of commercial success.

In addition, between 1978 and 1981, a fourth pinball manufacturer, Stern Electronics, licensee of the invention, was able to use its license to rejuvenate the bankrupt Chicago Coin and become a viable competitor in the pinball market.

Since the introduction of the invention, substantially all of the industry has converted to use of electronically controlled pinball machines using the invention. The commercial success cannot be denied.

(e) Recognition and acceptance of the patent by licensees

As the Court of Appeals for the Federal Circuit held in Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1539 (1983), "recognition and acceptance of the patent by competitors who take licenses under it to avail themselves of the merits of the invention is evidence of nonobviousness." On October 5, 1978, a license agreement was negotiated between Bally and its competitor, Stern Electronics, which allowed Stern to avail itself of the merits of the Nutting and Frederiksen invention. Stern has paid over \$700,000 in royalties under this license agreement. Thus, Stern, a competitor well versed in the art, concluded that the invention was novel and recognized it as a valuable innovation.

VI. THERE WERE NO INVENTIONS WHICH ANTICIPATED THE REISSUE PATENT; THERE WERE ONLY ATTEMPTS AND FAILURES

The statute also conditions the grant of a patent upon the novelty of the invention. Title 35 U.S.C. § 101 provides that the statute requires that the invention must be new and useful. In Section 102 the statute requires that no one have previously created the patented invention. The relevant portions of Section 102 provide:

"A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

. . . .

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

In order to support a finding of invalidity under Section 102, the defendants must establish by clear and convincing evidence that the alleged prior invention was reduced to practice. National Tractor Pullers Ass'n, Inc. v. Watkins, 205 U.S.P.Q. 892, 912 (N.D. Ill. 1980). If the only evidence is oral testimony relating to unpatented devices, the burden upon the defendants is to submit clear and convincing evidence of complete anticipation. Every reasonable doubt should be resolved against the defendants. The Barbed Wire Patent, 143 U.S. 275, 284-285 (1892):

We have now to deal with certain unpatented devices, claimed to be complete anticipations of this patent, the existence and use of which are proven only by oral testimony. In view of the unsatisfactory character of such testimony, arising from the forgetfulness of witnesses, their liability to mistakes, their proneness to recollect things as the party calling them would have them recollect them, aside from the temptation to actual perjury, courts have not only

imposed upon defendants the burden of proving such devices, but have required that the proof shall be clear, satisfactory, and beyond a reasonable doubt. Witnesses whose memories are prodded by the eagerness of interested parties to elicit testimony favorable to themselves are not usually to be depended upon for accurate information. . . . If the thing were embryotic or inchoate; if it rested in speculation or experiment; if the process pursued for its development had failed to reach the point of consummation -- it cannot avail to defeat a patent founded upon a discovery or invention which was completed, while in the other case there was only progress, however near that progress may have approximated to the end in view.

Reduction to practice means that there was a complete conception of a buildable and operable device which was actually made and shown by tests to work in its intended environment. The uncorroborated oral testimony of the inventors will be insufficient to meet the heavy burden of proof on these elements of the defendants' allegations.

National Tractor Pullers Association, Inc. v. Watkins, 205 U.S.P.Q. 892, 912 (N.D. Ill. 1980); Payet and Brummet v. Swidler and Wilson, 207 U.S.P.Q. 168, 174 (Bd. Pat. Inter. 1980).

If they are to succeed in their claim of anticipation, defendants bear the burden of providing clear and convincing evidence:

(1) that each and every element of the claimed invention was present in the alleged prior invention, for example in the El Toro mock-up.

Vancil and Jenkins v. Arata, 202 U.S.P.Q. 58, 61

(BI 1977); 397 F.2d 342, 347-48 (C.C.P.A.), cert. den. 393 U.S. 980 (1968);

(2) that the alleged prior invention was completed in an operative form capable of successfully demonstrating its practical utility for its intended use. Field v. Knowles, 183 F.2d 593, 601 (C.C.P.A. 1950);

(3) that the alleged prior invention was completed in a form which could operate satisfactorily in a typical pinball environment. Field v. Knowles, 183 F.2d 593, 601 (C.C.P.A. 1950); and

(4) that there is a nexus between tests performed and the intended functional setting contemplated by the claims, the typical pinball environment. Koval v. Bodenschatz, 463 F.2d 442, 447 (C.C.P.A. 1972); Paivinen v. Sands, 339 F.2d 217, 226-27 (C.C.P.A. 1964).

The Patent Office in contested reissue proceedings found that before the invention by applicants there had been no reduction to practice of any other computer based pinball machine which could function in the intended environment.

In National Tractor Pullers Association, Inc. v. Watkins, 205 U.S.P.Q. 892, 911 (N.D. Ill. 1980), the court was faced with the novel issue of the weight to be given to patent office fact findings made in a contested reissue proceeding: "the Patent Office decision must be accepted as controlling upon that question of fact in any subsequent

suit between the same parties unless the contrary is established by testimony which in character and amount carries thorough conviction."

The defendants will be unable to sustain this burden or, the clear and convincing burden recently established by the Court of Appeals for the Federal Circuit in Sears (Exhibit N), and other cases. Their evidence will show only that each of the alleged inventions, which the defendants claim were prior to the invention defined in the reissue patent, were attempts and failures.

The evidence at trial will show that in order to be a reduction to practice, a pinball machine must be able to function in a pinball environment. The pinball machine must therefore be immune from electrical noise malfunction. The defendants will be unable to establish that the El Toro or any other prior electronic pinball development could meet this test.

VII. THE DEFENDANTS HAVE INFRINGED THE PATENT

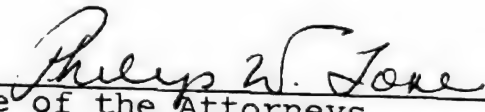
The defendants Williams and Gottlieb are charged with direct infringement of the patent by making and selling the patented invention within the United States in violation of 35 U.S.C. § 271(a). The evidence at trial, including expert testimony, will amply support Bally's claim of infringement. Among other evidence, Bally will introduce evidence that the defendants actually copied the invention in an effort to meet industry demand.

Defendant Rockwell is charged with actively inducing infringement under 35 U.S.C. § 271(b), and contributory infringement under 35 U.S.C. § 271(c). Inducement may be any action which causes, urges or encourages infringement. National Tractor Pullers Ass'n v. Watkins, 205 U.S.P.Q. 892, 913 (N.D. Ill. 1980).

CONCLUSION

The evidence at trial will show that the defendants actively infringed the patent and thereby impaired Bally's lawful exploitation of its patented invention in violation of the statute.

Respectfully submitted,


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Dated: December 29, 1983

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Where claims are silent as to specific limitations, they cannot be implied in the claims.* The possibility of implied limitations is particularly foreclosed when other claims contain the relevant limitations.

Despite all the testimony about matrix-multiplexing, only one of the claims in issue, claim 46, specifies a matrix. Likewise, none of the claims in issue specify use of a low-Beta transistor, none recite use of a second decoder for the solenoids, none specify use of opto-isolators, and none call for maintenance of a separate test line for noise suppression. Dr. Schoeffler testified about these aspects of the "invention". Such limitations are included only in claims which Bally does not assert (e.g. claims 29, 30, 33 and 40).

This Court has previously ruled that different claims with different language should not be construed to mean the same thing. To do so "would be to impute to the draftsman of the claims a lack of purpose in using different language." Kreis AG v. American Hospital Supply Co., 192 U.S.P.Q. 585, 588 (N.D.Ill. 1976) (Grady, J.).

The Court of Appeals for the Federal Circuit spoke to this issue just twelve days ago. In Raytheon Co. v. Roper

*Dr. Schoeffler has testified about inferred and implied disclosure in the specification. Presumably such disclosure will be alleged to be included in the claims by implication. (See Transcript, e.g. at 927, 928, 929).

Corp., ___ F.2d ___, Appeal Nos. 83-851, 83-853, slip op. Dec. 30, 1983, a case involving §§ 101 and 112 issues, Chief Judge Markey wrote:

"The district court impermissibly read the above-quoted language from claim 1 into claims 3 and 4. The impropriety of reading limitations into claims is dramatized where, as here, the limitation sought to be added is already present in another claim." (Citations omitted).

In arguing that claims must be read in light of the specification, that prevention of backflow is the "essence" of Torrey's invention, and that all claims must therefore be read as including the quoted limitation of claim 1, Raytheon confuses the respective roles of the specification and claims. That claims are interpreted in light of the specification does not mean that everything expressed in the specification must be read into all the claims."

Thus, for example the limitation of a "matrix" cannot be read into a claim such as claim 45, which merely recites "multiplexing means". A "matrix" is expressly claimed in dependent claims 46 and 49. The doctrine of claim differentiation precludes such claim construction. The existence of narrower claims, such as claim 46 which adds the limitation of a matrix, preclude a construction that such limitations exist in broader claims such as claim 45. General Electric Co. v. United States, 572 F.2d 745, 753 (Ct. Cl. 1978); Kalman v. Kimberly-Clark Corp., 713 F.2d. 760, 770 (Fed. Cir. 1983); Deere & Co. v. International Harvester Co., 658 F.2d 1137, 1141 (7th Cir.), cert. denied, 454 U.S. 969

(1981); Duplan Corp. v. Deering Milliken, Inc., supra, 444 F.Supp. at 710. The Court of Appeals for the Federal Circuit has stated the principle of claim differentiation thusly:

"[I]t is settled and proper law that 'where some claims are broad and others narrow, the narrow claim limitations cannot be read into the broad whether to avoid invalidity or to escape infringement.' "

Kalman v. Kimberly-Clark Corp., 713 F.2d 760, 770 (Fed. Cir. 1983).

The principle was also discussed in Texas Co. v. Globe Oil & Refining Co., 112 F.Supp. 455 (N.D.Ill.1953), aff'd, 225 F.2d 725 (7th Cir. 1955), where the court said, in part:

"The essence of the doctrine ... is ... that the spelling out of the specific limitation in one or more claims gives special significance to the absence of such a specific limitation in another claim, because under such circumstances the attention of the applicant and the Patent Office is shown to have been directed to the limitation or to its absence, and the intent is clear that when the limitation was intended it was expressed."

112 F.Supp. at 467.

In the present claims, when Plaintiff intended to limit the claims to a matrix, to a low-Beta transistor, to an opto-isolator, etc., those claim limitations were expressly set forth. For example, see claims 2, 3, 7, 10, 35, 40, 46, 49, 56, 62, 63, 67, and 90. Claim 45 which merely recites a multiplexing means does not include such limitations.

Section 112 provides, in relevant part:

"The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof."

The express liberality of the last paragraph of 35 U.S.C. Section 112 is subject to limitation. Congress did not intend, by the last paragraph in Section 112, to destroy certain fundamental precepts of patent law.

Most importantly, it is still true "the claim is the measure of the invention". In re Lundberg, 244 F.2d 543, 547 (C.C.P.A. 1957). Accord, Bepex Corp. v. Black Clawson Co., 208 U.S.P.Q. 109, 118 (S.D. Ohio 1980), aff'd, 713 F.2d 202 (6th Cir. 1983); Environmental Designs, Ltd v. Union Oil Co., 713 F.2d 693, 699 (Fed. Cir. 1983).

The requirement that claims particularly point out and distinctly claim the subject matter regarded as the invention has not been diminished by the addition of the last paragraph of Section 112. In re Lundberg, 244 F.2d at 547.

The last paragraph of Section 112 must be read in light of the previous paragraphs and given a consistent meaning. In re Lundberg, 244 F.2d at 547-48; Bepex Corp. v. Black Clawson Co., 208 U.S.P.Q. at 118.

Apparently Bally's position is that the means clauses recited in the claims of the '441 patent incorporate the corresponding structure described in the specification. Carried to its conclusion, such a construction of Section 112 eliminates the difference between the claims where the elements are recited broadly as means for performing specified functions, and narrower claims in which the same elements are recited in detail.

The Court of Customs and Patent Appeals, the predecessor of the Court of Appeals for the Federal Circuit, rejected such an argument in In re Lundberg, supra:

"We are of the opinion... that, notwithstanding the [last] paragraph of Section 112, it is the language itself of the claims which must particularly point out and distinctly claim the subject matter which the applicant regards as his invention, without limitations imported from the specification, whether such language is couched in terms of means plus function or consists of a detailed recitation of the inventive matter. Limitations in the specification not included in the claim may not be relied upon to impart patentability to an otherwise unpatentable claim."

244 F.2d at 548.

Recently, the Court of Appeals for the Federal

Circuit reached a similar result:

"The claim, not the specification, measures the invention. [Appellant's] argument that claim 1 must include a limitation found in the specification is thus legally unsound."

Environmental Designs, Ltd. v. Union Oil Co., 713 F.2d 693, 699 (Fed. Cir. 1983) (citations omitted).

Bally had three years to prepare suitable claims which would cover its pinball game during the prosecution of its original patent. It then filed a reissue application, and was afforded five additional years to draft claims for the pinball game. It was permitted to present claims of varying scope. It submitted broad "means for" type claims, and narrow claims reciting the elements of the pinball game in detail.

In Duplan Corp. v. Deering Milliken, Inc., 444 F.Supp. 648,710 (D.S.C. 1977), aff'd in part, rev'd in part on other grounds, 594 F.2d 979 (4th Cir. 1979), cert. denied, 444 U.S. 1015 (1980), the patentee claimed his invention broadly in

claim 3 as a "means heating the walls of [a] tube" that yarn traveled through. The prior art showed circulating hot oil for heating the yarn while the specification taught only heating by electrical resistance. The patentee argued that Section 112 required the means for heating to be read in light of the specification and limited to the embodiments shown in the specification. The court rejected the argument, stating:

" 'while the claims should be construed in the light of the specification to obtain an understanding thereof, the limitations specified cannot be read into the claims.'"

[The patentees], having claimed broadly, may not now avoid [the prior art] by arguing that their patent only refers to an electrically heated tube that imparts heat evenly from 360° surrounding the yarn...."

Duplan Corp. v. Deering Milliken, Inc., 444 F. Supp. at 710.

"When the function clause in a claim fails to recite a necessary limitation to render the claim valid, a court may not resort to the specification to make that limitation a part of the claim."

Toro Co. v. L.R. Nelson Corp., 524 F.Supp. 586, 590 (C.D. Ill. 1981).

A means type claim "must be interpreted to cover any physical body or bodies having the capacity to perform the function recited after the words 'means for', and is to be construed as calling for any means capable of performing the

indicated function." Bepex Corp. v. Black Clawson Co., 208

U.S.P.Q. at 118. The Bepex case treats the issue specifically:

"The last portion of [Section 112], reciting that a 'means plus function' claim 'shall be construed to cover the corresponding structure, material or acts described in the specification and equivalents thereof', relates primarily to the construction of such claims to determine when the claim is infringed. Its purpose was not to narrow such claims to distinguish the prior art."

Bepex Corp. v. Black Clawson Co., 208 U.S.P.Q. at 118 (citations omitted.) See also, In re Cole Patent Litigation, 558 F. Supp. 937, 945 (D.Del. 1983).

The reissue proceedings were conducted with a view toward this litigation. If Bally intended to include specific features of its apparatus as part of its invention, Bally had five years during the reissue proceedings to amend its claims to attempt to insert such limitations. If Bally had done so, the amended reissue claims could not affect the pinball machines made prior to the issuance of the reissue patent.*

*"No reissue patent shall abridge or affect the right of any person...who made...prior to the grant of a reissue of anything patented by the reissued patent, to continue the use of, or to sell to others to be used or sold, the specific thing so made...unless the making, using or selling of such thing infringes a valid claim of the reissued patent which was in the original patent." 35 U.S.C. Section 252.

Given the extremely depressed status of the pinball industry, there would have been no damages. Instead Bally retained its original claims to preserve the prospect of damages and now is attempting to read saving limitations into such claims. Bally may not change its position regarding what the invention is after failing to claim features now relied upon as part of the invention.

Efforts by patentees to change position regarding the construction of their claims have been uniformly condemned. A patentee cannot construe the claims one way in the Patent Office, and another way in an infringement suit. Compro-Frank Corp. v. Valk Manufacturing Co., 216 U.S.P.Q. 531, 546 (E.D. Pa. 1982); Coleco Industries, Inc. v. International Trade Commission, 573 F.2d 1247, 1256-58 (C.C.P.A. 1978).

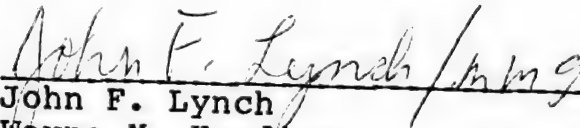
In an effort to do justice and equity between the parties, it is sometimes said that a court may sometimes "interpret patent claims in the light of the specification". In re Prater, 415 F.2d 1393, 1404 (C.C.P.A. 1969), since a patentee does not have the opportunity to amend his claims in an infringement suit. Id. at 1404-05. But this case does not involve such equities. Bally conducted a five year reissue proceeding with a view toward asserting the reissue patent obtained in this suit. Bally had ample opportunity to amend its claims to include features now relied upon, and did not do so. For example, during the reissue proceedings, Bally never

contested protestors' arguments that the software was not part of the invention. Bally chose to obtain claims of differing scope. It cannot now ask this Court to rewrite some of them to include distinctions from the prior art that simply are not present.

"Courts can neither broaden nor narrow the claims to give the patentee something different than what he has set forth. No matter how great the temptations of fairness or policy making, courts do not rework claims. They only interpret them."

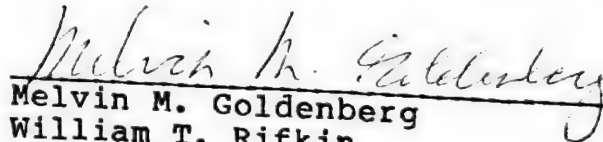
Autogiro Co. v. United States, 384 F.2d 391, 396, 155 U.S.P.Q. 697, 701 (Ct. Cl. 1967).

Respectfully submitted,



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FILED

JAN 23 1984

H. STUART CUNNINGHAM
CLERK, U. S. DISTRICT COURT

BALLY MANUFACTURING CORPORATION,

Plaintiff,

v.

D. GOTTLIEB & CO.,
WILLIAMS ELECTRONICS, INC.
and

ROCKWELL INTERNATIONAL CORPORATION,

Defendants.

CIVIL ACTION NO. 78 C 2246

Judge John F. Grady

DOCKETED

PLAINTIFF'S TRIAL MEMORANDUM
ON PATENT CLAIM INTERPRETATION

JAN 24 1984

As requested by the Court during trial in the above cause on January 5, 1984, plaintiff submits this memorandum with respect to the proper interpretation of patent claims with "means plus function" language, and particularly with respect to the present claims being asserted in the patent in suit, Re. 31,441. Plaintiff asserts six claims of the patent, viz., Claims 45, 46, 47, 48, 49 and 95.

As will be clearly demonstrated in this memorandum, the claims must be construed in accordance with the applicable statutory rules of claim construction for "means plus function" language. These rules require that a "means plus function" claim be construed to cover the structure described in the patent specification which corresponds to the means referred to in the claim, and also to cover equivalents of that structure. As properly construed, the multiplexing means for performing the functions recited in the claims in suit include a matrix, as well

as the means for providing an operable device. As discussed hereinafter, this is shown by the patent specification and drawings. Also, this has been the consistent position with respect to the meaning of the claims taken by the Patent Examiner, the plaintiff, and even the defendants throughout the reissue proceedings. Defendants' memorandum on this matter refers to no facts to the contrary. Further, it will be demonstrated that this construction of the claims is reinforced by the judicial doctrine of claim differentiation properly applied.

The Invention

The invention as defined in the above claims of the patent represents the first practical electronically controlled pinball machine, which ultimately displaced all other types of pinball machines. As disclosed in the patent it uses a matrix-multiplexing technique for interconnecting a microcomputer to the pinball playfield switches and display elements.* The inventors were the first to be able to mate the conventional electromechanical pinball technology with the semiconductor microcomputer technology. They recognized and solved the serious problems of electrical noise, error recovery, and real time operation required in pinball machines.

*That the software listing filed in the Patent Office as part of the patent application is part of the patent will be demonstrated elsewhere. This memorandum is limited to the point on which the Court directed that a memorandum be filed.

As in many patents dealing with electronic systems, the claims of the patent define features of the invention in terms of "means" for performing each of the various functions. Of course, the claims contemplate operable means, not an inoperable system. Furthermore, and consistent with standard practice, they do not state the problems themselves solved by the invention. Rather, they state the combination of structure and "means" for performing functions which, if constructed according to the patent specification and drawings, or equivalents thereof, will result in overcoming the problems.

It is the purpose of the claims to define the metes and bounds of the exclusive property rights. It is the purpose of the specification and drawings of the patent to teach how to make and use the invention. Thus, the purpose served by the claims, dictated by the second and last paragraphs of 35 U.S.C. §112, is different from the specification and drawings, dictated by the first paragraph of §112, and each serves its proper purpose in a proper manner in the '441 patent.

The Claims Are Properly Construed Under
35 U.S.C. §112 As Relating To
Matrix-Multiplexing And As So Construed Are
Consistent With The Doctrine Of Claim Differentiation

Claims 45 and 95 are the only independent claims being asserted. Since for present purposes Claim 95 contains essentially the same language as Claim 45, the discussion here will be confined to Claim 45, and this claim is properly construed under §112 as relating to matrix multiplexing. With this construction, Claim 45 as well as the claims which depend

from Claim 45 (i.e., Claims 46 through 49) are also consistent with the doctrine of claim differentiation, as will be shown below.

Claim 45 uses so-called "means plus function" language provided for in §112 of the patent statute, and particularly contains the following language relating to the "multiplexing means":

"multiplexing means operatively connected to the processor for cyclicly and sequentially enabling the signaling means to signal the processor that its associated response means has detected the ball, and for cyclicly and sequentially enabling the display activation means to activate its associated display means; said processor having means for storing the signals from the signaling means enabled by the multiplexing means in the memory means, for addressing the program means and the memory means, and for signaling the display activation means enabled by the multiplexing means, in response to the program means and the memory means."

that: The last paragraph of §112 of the statute provides

"An element in a claim for a combination may be expressed as a means . . . for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." (emphasis added)

This paragraph of §112 permits an element to be set forth in a claim as a means for performing a function and when so written it will comprehend that which is shown in the specification specifically to support the functional statement and equivalents thereof. Kayton on Patents, Second Edition, 1983, pp. 2-19, 20. (Selected pages are attached as Exhibit A.)

As that authority states, "This kind of patent claim construction for 'means plus function' clauses based upon equivalence of the structure in the specification is applicable equally to prior art and infringement issues, as Judge Jack Miller [now] of the CAFC expressly stated when sitting by designation in Square Liner 360°, Inc. v. Chisum, 691 F.2d 362, 216 U.S.P.Q. 666, 670 (8th Cir. 1982)." Kayton supra, pp. 2-21. Accord, Medtronic Inc. et al. v. Cardiac Pacemakers, Inc., 220 U.S.P.Q. 97 (Fed. Cir. 1983). (Attached as Exhibit B.) In Medtronic, at p. 111, Chief Judge Markey, writing for the court, stated that both validity and infringement involve construction of patent claims, and the construction must be the same in determining both. The defendants' assertion in Court to the contrary (T. pp. 329-331), and their reliance on cases such as In re Lundberg, 244 F.2d 543 (C.C.P.A. 1957), cited in Court and referred to in their Memorandum of January 12, 1984, at p. 6, is misplaced because Lundberg deals with the interpretation of a claim pending during the examination in the Patent and Trademark Office ("PTO"), and not of a patented claim in court. Pending claims in the PTO are properly construed differently, and usually more broadly, as discussed below.

In pending patent applications under examination, the Patent and Trademark Office ("PTO") does not construe a "means plus function" clause, in rejecting a claim over prior art, in the manner required by the last paragraph of §112. "[T]he PTO will not look to the 'corresponding structure... and equivalents thereof' in the specification in order to determine the scope of

the means plus function language. The examiner looks solely to the language itself and gives it its broadest reasonable interpretation consistent with the scope of enablement in the specification..." Kayton, supra, p. 2-21, citing Rosenberg, PATENT LAW FUNDAMENTALS, 48 (1975). "This rule of construction in application prosecution does little harm and has been sanctioned by the CCPA in related areas of claim construction since, given a rejection based upon such a broad construction, 'the applicant may then amend his claims' (something not possible with a patent at trial). In re Reuter, 651 F.2d 751, 210 U.S.P.Q. 249, 253 (C.C.P.A. 1981)." Kayton, supra, pp. 2-21, 22.

Thus, even giving the "means plus function" language of Claim 45 its broadest reasonable interpretation consistent with the scope of enablement in the specification, as construed by the PTO, the claims must be limited to matrix multiplexing because, as discussed in detail below, (1) the specification and drawings of the patent relate only to matrix multiplexing, i.e., multiplexing of a matrix as opposed to other forms of multiplexing generally, and (2) the examiner, the plaintiff and even the defendants, throughout the reissue proceeding in the PTO construed the above claim language as meaning matrix multiplexing. Additionally, others such as Atari's attorney also construed all of the original patent claims to relate to matrix multiplexing.

The application of the doctrine of claim differentiation with respect to Claim 46 also confirms this conclusion. Contrary to the representations made by the defendants, Claim 46, which depends from Claim 45, does not merely refer to a matrix. Rather, Claim 46 specifically recites that:

"...signaling means associated with the respective response means [e.g., the switches and associated circuitry] and the display activation means associated with the respective display means [e.g., the digital displays or lamps and associated circuitry] are operatively connected as a plurality of sets of elements in a matrix, the multiplexing means having means for cyclicly and sequentially enabling each set of elements of the matrix."

This means that Claim 46, on the one hand, requires at least one matrix which contains both switches and displays. That is, the matrix contains sets of elements which include both switches and displays, and that the multiplexing means has means for cyclicly and sequentially enabling each set of elements. In the embodiment of the patent, as described in the specification and shown in the drawings, the sets of elements form the columns of the matrix, and the columns include switches, digital displays and lamps.

Claim 45, on the other hand, is not restricted to a matrix with two such sets of elements connected (i.e., "...plurality of sets of elements in a matrix, ..."), but could include multiplexing one or more matrices so long as any one matrix contains only switch elements or only display elements but not both. Only Claim 46 covers a matrix with both, by virtue of the doctrine of claim differentiation. Of course, Claim 45 would

also cover the multiplexing of three matrices where one matrix contains only the switch elements, a second matrix contains only the digital display elements and a third matrix contains only the lamp elements. (Again, Claim 46 requires at least one matrix with both switches and displays.)

The use of a single matrix as shown in the preferred embodiment of the patent was particularly advantageous with the microcomputer and other electronic components available in 1974. However, more recently available microcomputers and related components resulting from further developments in the semiconductor and microcomputer arts make it possible to implement the principles of the patented invention with multiple matrices, in which each matrix contains only one type of element. This still employs the patented invention, and obtains the benefit of an economical microprocessor controlled pinball machine, using faster and more powerful semiconductor components.*

Accordingly, it is readily seen that Claim 46 is narrower than Claim 45, even though both involve multiplexing a matrix, and thus both claims are consistent with the doctrine of claim differentiation. The fallacy in defendants' argument based on the doctrine of claim differentiation is not with the doctrine itself, but with a misstatement of what Claim 46 requires. Defendants only refer to the word "matrix" in Claim 46, and fail to note the actual technological limitation or narrowing that,

*Even if more than one matrix is used, there will still be a substantial savings in driver circuitry and wire as compared to a direct drive or other similar system.

for example, the matrix has a plurality of sets of elements and the elements are both switch elements and display elements. Thus, the doctrine does not mean that there is no matrix in Claim 45, but that Claim 45 is broader than Claim 46 in that it does not require both switches and display elements to be connected in the same matrix structure. Consequently, the doctrine of claim differentiation by no means supports the argument that Claim 45 does not require a matrix.

Indeed, given the requirement of the last paragraph of §112, the doctrine of claim differentiation dictates that Claim 45 cannot be limited to a single matrix. Claim 46 specifies that the switches and displays must both be in a single matrix. Since Claim 45 is broader, the switches and displays cannot be restricted to being in the same matrix because they are so restricted in Claim 46. Therefore, Claim 45 must necessarily comprehend the possible arrangement of more than one matrix to the extent that pinball games will have switches, digital displays, lamps, etc., which can each be in a separate matrix. Although the specific embodiment of the invention disclosed in the patent specification and drawings has the switches, lamps and digits connected in the same matrix, claim differentiation requires Claim 45 to have a broader definition than the specific embodiment shown, consistent with the scope of enablement in the specification.

Likewise, the testimony of the inventors and Dr. Schoeffler clearly shows that the means plus function language of Claim 45 includes the means disclosed in the specification and drawings, including the program listing, for providing, in addition to the matrix multiplexing, noise immunity and prevention and real time response so that the game operates like a pinball machine.

With respect to infringement, the means for providing these functions need not be the exact means disclosed in the patent, but include equivalents thereof. So, in other words, even though the defendants, as they assert in their memorandum, may not use a "low Beta transistor", "opto-isolators" or a "separate test line", and the claims expressly reciting these structural elements have not been asserted, they do indeed employ some means for performing the functions of these elements in their respective pinball machines. The means for providing these functions used by the defendants in their respective products will be shown to be the full equivalent of the particular means used by the inventors, but with more modern and sophisticated semiconductor components which became available.

In any event, however, the testimony of Dr. Schoeffler will show conclusively that each of the defendants use the same or equivalent means for performing these functions through hardware and software techniques (or combinations of these techniques) to produce their commercial pinball machine products

using matrix multiplexing systems to interconnect a microprocessor to the various pinball machine elements in accordance with the claimed invention.

The "Multiplexing Means" Language of the
Claims Refers to Matrix Multiplexing
Based on the Patent Specification and Drawings

The patent specification and drawings disclose and teach only a matrix multiplexing system, as opposed to any other type of multiplexing. That is the principal thrust of the patent. For example, Figure 4 is a diagrammatic illustration of the "Mux Chart". That is, the matrix in a multiplexing arrangement for the particular pinball game shown in Figures 1 through 3, which is described in detail in the patent specification.

Throughout the specification, the term "multiplexing means" or "multiplexing" is used synonymously or interchangeably with "matrixing means" or "matrix". However, where the matrix structure itself is being referred to, it is generally referred to as the "matrix board". Thus, for example, under the heading "SUMMARY OF THE PRESENT INVENTION", at Col. 2, lines 25-30, the specification states:

"Generally, in accordance with the present invention, the display means, the element activated response means, and the interlocking control means are arranged into sequentially activated element groups and connected through a matrixing or multiplexing means ..." (emphasis supplied).

and at lines 45-47, it states:

"The several elements activate switch means and establish signals to a common matrixing or multiplexing circuit." (emphasis supplied)

Further, for example, at Col. 3, lines 5-7, the specification states:

"The output from the multiplexing or matrix board is further interconnected ..."

Read as a whole, the entire description in the patent disclosure can leave no doubt but that "multiplexing means" refers to matrix multiplexing.

The "Multiplexing Means" Language of the
Claims Refers to Matrix Multiplexing
Based on the Reissue Proceedings in the PTO

(1) The Examiner Considered the Claim
Language to Refer to Matrix Multiplexing

During the prosecution of the reissue application, the Examiner made statements that demonstrate that he was construing the multiplexing means plus function clause in Claim 45, and the same clause in other claims, such as Claim 1, as referring to matrix multiplexing. Thus, even when he construed these claims during the reissue application prosecution to read as broadly as reasonable, consistent with the scope of the specification, as permitted by Lundberg, supra, and by Reuter, supra, he construed them to include a matrix.

For example, in the Examiner's Official Action, Paper No. 114, PX 1, Vol. 14, Tab 128, the Examiner dealt with all of the claims that are now in the reissue patent including Claims 45 and 95, as well as Claim 1. All of these claims have the

multiplexing means plus function clause. At page 5 of that Official Action (Bates No. 1313), the Examiner points out that the "Reissue applicant [is] maintaining that the invention does not reside in any one element alone but in the total structural combination of a matrix, multiplexed, computer controlled pinball game, as claimed." (emphasis supplied). When the Examiner was considering the subject of "conception", he referred to the invention as a "matrix, multiplexed hardware design." Id. Thus, the Examiner considered the claimed invention to employ the "matrix, multiplexed hardware design" and not some other type of multiplexing, generally.

As another example, later in the reissue proceedings, the Examiner requested additional information on the subject of whether the claims were "nonobvious" or "obvious" over a prior art patent to Burnside (which is now listed by the defendants as one of their §282 references on which they rely in this case), Paper 122, pp. 1 and 4, PX 1, Vol. 15, Tab 136. In response, the plaintiff argued that, despite the defendants' arguments of obviousness, the claims were nonobvious, and specifically referred to the invention as claimed as a matrix multiplexing system. Paper No. 126, pp. 33-36, PX 1, Vol. 15, Tab 140 (Bates Nos. 1522-1525). The Examiner then held the claims nonobvious over the Burnside patent. Thus, it can be seen that initially the Examiner characterized the claimed invention as employing

multiplexing of a matrix, the plaintiff when asked for additional information on the issue of nonobviousness characterized it as matrix multiplexing and the Examiner allowed the claims in the light of that assertion.

(2) The Defendants Considered the Claim
Language to Refer to Matrix Multiplexing

The defendants, themselves, clearly characterized the claimed invention as matrix multiplexing during the reissue proceedings, contrary to their position during this trial. For example, in PTO Paper No. 57, PX 1, Vol. 9, Tab 63, which was a "Reply by Protestors Gottlieb and Rockwell to Second Office Action and Bally's Response Thereto" (at Bates No. 0612), defendants Gottlieb and Rockwell state that,

"the Examiner recognized in Paper No. 46 at page 5, that sequentially and cyclically multiplexed matrix arrangements were known in moving mass arcade games".

They further state in relationship to the Burnside prior art patent that,

"In the Burnside patent, a matrix of playfield switches in a pinball game is cyclically and sequentially scanned by an electromechanical controller." (underscoring by defendants in original).

These statements show that the defendants were asserting that the Examiner considered the invention to require matrix multiplexing and the defendants were suggesting that the prior art disclosed the required matrix multiplexing.

Further, in Gottlieb and Rockwell's reply to the applicants' response to the sixth Office Action, PTO Paper No. 91, Vol. 11, Tab 101, at page 5 (Bates No. 0936), defendants state,

"Moreover, when the Nutting patent is reviewed, what is taught other than multiplexing inputs and digits arranged in a matrix?" (second underscoring supplied)

Thus, these defendants were in agreement with the Examiner that the patent discloses matrix multiplexing and no other, and that this is the teaching of the patent. Defendants never asserted that any of the claims dealt with anything other than matrix multiplexing until they reversed their position recently during the trial.

(3) The Plaintiff Considered the Claim
Language to Refer to Matrix Multiplexing

Going back to the prosecution history of the original patent, plaintiff's attorney treated Claim 1 of the patent, which was Claim 27 in the pending application and contained exactly the same "multiplexing means" plus function language as Claims 45 and 95 of the reissue patent. PX 2, Amendment C, p. 19 (Bates Nos. 124, 125), dated October 17, 1977. In that paper, plaintiff's attorney, in arguing patentability over a prior art patent to Ariano, stated that,

"Incidentally, it should be particularly noted that the Ariano patent does not appear to disclose any time division multiplexing. Additionally, although the Ariano patent might be considered to disclose a matrix of elements, they do not appear to be multiplexed as in the game of the present application." (underscoring supplied).

Thus, plaintiff argued that although Ariano disclosed a matrix, it did not otherwise meet the terms of the claim. Hence, this clearly indicates that even during the prosecution of the original patent, the multiplexing means of the claims in suit were intended and contemplated to require a matrix.

Turning then to the reissue application, a review of the 20 volumes in that file wrapper would show repeated characterization of the broadly claimed invention by the plaintiff as referring to matrix multiplexing. As an example, in the Applicants' Response to the First Office Action, Paper No. 31, p. 62, PX 1, Vol. 6, Tab 37, (Bates No. 0358), the plaintiff's attorney listed specific claims including present reissue Claim 45. In referring to certain alleged prior activities of the Cyan Engineering group of Atari, relied on by the defendants as prior art, plaintiff's attorney stated (at Bates No. 0362) that "...the fact that Atari abandoned the Cyan system ultimately shows that they did not recognize the multiplexed matrix system as a feasible approach," Further (on Bates No. 0393), it is stated "that it was actually unobvious to Atari that the multiplex matrix system of applicants' claims should be adopted for pinball machines in order to produce a practical and cost-effective commercial product." (underscoring supplied). Clearly, plaintiff considered the claim language to refer to matrix multiplexing during the entire history of the original and reissue patents.

(4) Atari Considered the Claim Language
To Refer to Matrix Multiplexing

Atari, whose early work at its Cyan Engineering group, is relied on by defendants as prior art to the claimed invention, ultimately brought out a commercial microprocessor based pinball machine called "Atarian". The Atarian was the subject of a notice of infringement from the plaintiff to which Atari responded by letter, dated December 18, 1978, from its attorneys, which appears in PX 1 as Exhibit C to PTO Paper No. 31, Vol. 6, 7 and 8, at p. 20 (Bates Nos. 0316-0317). That letter from Atari stated that a literal reading of the patent claims would in essence result in no infringement of any Atari pinball game because "none of the Atari microprocessor based electronic pinball machines employ such matrix multiplexing". (underscoring supplied). Plaintiff acquiesced in that position by taking no legal action against Atari.

Further, one of Atari's engineers, Steven Mayer, testified on deposition "that Atari is a pinball manufacturer and we use a different architecture than that described in the major claims of the patent." (Bates No. 0317). And, in respect to this issue, plaintiff's attorney stated,

"The later system designed by Atari's Los Gatos engineers and used in their commercial pinball machines did not employ the claimed invention, based on the present record." (Bates No. 0318).

Thus, it is clear that Atari's attorneys, Atari's engineer and plaintiff's attorneys were all in agreement that the claims require matrix multiplexing, and that merely using a microprocessor in a pinball machine is not enough to fall within the scope of the claims.

Given Their Broadest Reasonable Interpretation
Consistent with the Scope of Enablement in the
Specification the "Multiplexing Means" Language
Refers to Matrix Multiplexing Based on Current Case Law

Patent claims may, and often must, be interpreted by reference to the drawings and specification. "[I]t is fundamental that claims are to be construed in the light of the specifications and both are to be read with a view of ascertaining the invention". United States v. Adams, 383 U.S. 39, 49, 148 U.S.P.O. 479, 482 (1966).

In Adams, although the main claim did not mention use of water electrolyte in the patented battery, the Court found that the invention could be inferred to use water since subsidiary claims mentioned it and the patentee's stated objective was to make a water-activated battery. See Stanley Works v. McKinney Manufacturing Co., ____ F. Supp. ____, 216 U.S.P.O. 298, 307, n. 20, (D.C. Del. 1981).

As stated, by the Court in Stanley Works, supra, at p. 307, in respect to the interpretation of a claim involving an electrical switch-activating hinge mounted with a magnet,

"It is concluded the patent contemplates the switch and magnet being mounted behind the hinge's open face. This structure appears from the drawings accompanying the specifications. Further, a patent is a contract 'to be

interpreted according to the intent of the parties.' Catanzaro, supra, 423 F.2d at 431, 192 U.S.P.Q. at 709. This Court must view each claim in terms of the primary goal of the invention stated in the specifications, that of concealment [of the switch and magnet].²⁰

* * * *

20 ...Defendant has cited the 'doctrine of claim differentiation' by which it has been held that 'the presence of narrow claims, * * * is evidence that limitations are not to be written into the broader claim.' [citations omitted]. With regard to rear mounting, this Court finds that relegation of description of a rear mounting to the narrow claim 3 does not prevent 'writing it into' claim 1. With the explicit evidence of intent to conceal [the switch and magnet], the inferential evidence derived through claim differentiation is overwhelmed. The doctrine of claim differentiation is not destroyed by this reading. Because claim 3 describes not only the place of mounting, but the precise means of attachment, it remains narrower than claim 1."

Likewise, in the instant case, Claim 46 recites not only a matrix, but that it has sets of elements that include both switches and displays operatively connected to the matrix, and that the multiplexing means cyclically and sequentially enables each set of elements in the matrix. This is narrower and consistent with Claim 45 including multiplexing of a matrix generally, in accordance with the principles taught in the patent specification and drawings.

The Square Liner case, supra, 691 F. 2d 362, is instructive here. In that case, as here, the party asserting invalidity sought to have a means plus function claim construed very broadly for the purpose of a prior art obviousness defense. The Court, however, in an opinion by Judge Miller, now a judge of the Court of Appeals for the Federal Circuit, rejected

this approach because of the teachings in the specifications.

The patent in Square Liner related to an automobile frame-straightening machine having a so-called "vertical pull tower" and an hydraulic ram to vertically elongate the tower. The party asserting invalidity there argued that "means to vertically elongate the tower" in Claim 1 covered a prior art device which elongated the tower by an extension bolted to the tower. Rejecting this argument, the Court held that the means plus function clause in the claim was limited by §112 to mechanical devices performing the same function as the hydraulic ram described in the specification and thus did not describe the non-hydraulic prior art device, which elongated the tower by the insertion of an extension. The Court stated, at page 670:

"It is important at this point to determine the meaning of the claim language, 'means to vertically elongate said tower.' The specification of the '100 patent discloses a telescoping tower elongated by a hydraulic ram located therein. Square Liner argues that a pull tower in a prior art platform-type automobile frame straightening machine (of John Bean), which is elongatable by an extension bolted to the tower, has 'means to vertically elongate said tower.' The 'means to' language used in claim 1 is specifically provided for in 35 U.S.C. §112, which reads in relevant part:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

We are persuaded that equivalents of a hydraulic ram for elongating towers would be limited to mechanical devices for achieving the same function and that a tower which may be elongated

by the insertion of an extension does not possess the equivalent of a hydraulic ram. Therefore, the prior art pull tower does not have 'means to vertically elongate said tower.' The other prior art relied on by Square Liner to show 'means to vertically elongate' pull towers is even less directly related to the platform-type automobile frame straightening machine claimed by appellant." 216 U.S.P.Q. at 670.

Additionally, the Court, in Square Liner, noted that the Examiner's interpretation of the claim supports the Court's limitation to an hydraulic means. The Examiner, it will be recalled, has a duty to construe the claims to reach the broadest reasonable interpretation and is not constrained by the last paragraph of §112. The Court, in Square Liner, stated at page 670, n. 5,

"Even in the PTO reissue proceedings, where 'means plus function' language is not considered to be limited to equivalents of the means disclosed in the specification, In re Reuter, 651 F.2d 751, 210 USPQ 249 (C.C.P.A. 1981), the examiner rejected Square Liner's argument."

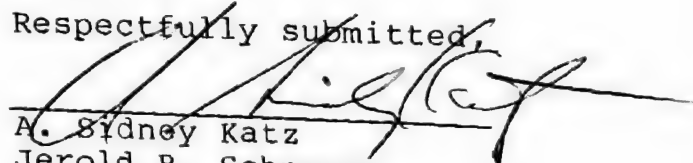
Here, as in Square Liner, the Examiner construed the claim during the reissue proceedings in the light of the specification in giving it the broadest reasonable interpretation. The Examiner read Claim 45's means plus function language to include a matrix. Thus, even the broadest reasonable interpretation of the multiplexing means plus function language in Claim 45 requires at least one matrix. This interpretation is in accordance with what both inventors, Frederiksen and Nutting, testified was part of their pinball machine invention.

Conclusion

The claims must be construed in accordance with the applicable rules of claim construction for means plus function language to cover the corresponding structure provided for in the specification and equivalents thereof. For the independent Claims 45 and 95, this requires that the multiplexing means include a matrix, as well as the means for providing an operable device. Thus, as so construed, the claims are of varying scope, and the doctrine of claim differentiation is satisfied.

The plaintiff's position as to the meaning of the claims has always been consistent and the same as that of the PTO and defendants during the reissue proceedings. However, the defendants have now changed their position at trial as to the scope and meaning of the claims.

Respectfully submitted,


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January 23, 1984

Attorneys for Plaintiff
Bally Manufacturing Corporation

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

BALLY MANUFACTURING CORPORATION,)

Plaintiff,)

v.)

D. GOTTLIEB & CO., WILLIAMS
ELECTRONICS, INC. AND ROCKWELL
INTERNATIONAL CORPORATION,)

Defendants.)

CIVIL ACTION no. 78 C 2246

Judge John F. Grady

DOCKETED
JAN 06 1979

STIPULATION

For the purposes of the trial of the patent in suit, or the reissue thereof, in the above action, the parties hereby agree for purposes of this litigation to the following stipulated facts:

1. Plaintiff's Exhibit (PX) 1 is a complete and accurate copy of the file history from the United States Patent and Trademark Office (PTO) of the reissue patent in suit (Reissue No. 31,441), except for portions of deposition transcripts which were submitted to the PTO. All deposition transcripts which PX 1 indicates were submitted to the PTO were, in fact, submitted, and are part of the file history of the reissue patent in suit.

2. PX 1 includes the following volumes of documents:

Volume No.

Bates Nos.

1	1 - 96.7
2	97 - 155.259
3	155.260 - 155.566-11
4	155.566-12 - 155.800
5	155.801 - 155.1301
6	155.1302 - 396.070
7	396.071 - 396.492
8	396.493 - 549
9 (Parts I and II)	550 - 780

Volume No.

10
11
12
13
14
15
16
17
18
19

Bates Nos.

780.1 - 920.040
920.41 - 1023
1024 - 1124.178
1124.179 - 1224
1225 - 1441
1441.1 - 1723
1724 - 1790
1791 - 1880.34
1881 - 1919.14
1919.15 - 2050

STIPULATED AND AGREED;

DATED: 1/4/84

BALLY MANUFACTURING CORPORATION

By: *Arnold B. Schenck*

DATED: 1/4/84

WILLIAMS ELECTRONICS, INC.

By: *Melvin M. Goldenberg*

DATED: 1/4/84

D. GOTTLIEB & Co.

By: *Wagner Harding*

DATED: 1/4/84

ROCKWELL INTERNATIONAL CORPORATION

By: *Wagner Harding*

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

FILED

JAN 3 1984

H. STUART CUNNINGHAM
CLERK, U. S. DISTRICT COURT

CIVIL ACTION
NO. 78 C 2246

JUDGE JOHN F. GRADY

BALLY MANUFACTURING CORPORATION,)
)
Plaintiff,)
)
v.)
)
D. GOTTLIEB & CO.,)
WILLIAMS ELECTRONICS, INC.,)
and ROCKWELL INTERNATIONAL)
CORPORATION,)
)
Defendants.)

DOCKETED
JAN 04 1984

DEFENDANTS' PRETRIAL BRIEF

I. INTRODUCTION

The seventy-five pages of Plaintiff's Trial Brief submitted by Bally Manufacturing Corporation ("Bally") is a studied effort in obfuscation. Bally alludes to the "complex nature of the invention", not to illuminate but to obscure the issues.*

Nowhere in its brief does Bally refer to the claims of the '441 patent asserted against defendants. Those asserted claims are 45-49, 51, 53-55 and 95. By reference to these claims, it is clear that the claims have absolutely nothing to do with overcoming problems relating to electrical noise or to any other phantom problem supposedly inherent in microprocessor pinball.

*(Pl. Br. p. 8)

What Nutting and Frederiksen did was follow a well-outlined prior art path to create a microprocessor controlled pinball game. Indeed, they were not even the first to do so. Nutting and Frederiksen created nothing remarkable and solved no problems. What they did was old, and ordinary, and obvious.

II. ELECTRICAL NOISE IS A SHAM ISSUE IN THIS CASE

None of the claims in issue relate in any aspect to circuit elements for overcoming noise problems. There are claims which are not in issue, that are peripherally related to noise. Noise is being raised here as some type of crippling problem supposedly solved by Nutting and Frederiksen. It in fact was not a problem, it is not part of the claims, and the techniques for overcoming electrical noise were well understood in the art.

Jeffrey Frederiksen testified concerning his microprocessor controlled "Flicker" game:

Q. Was it tested for noise problems?

A. We hadn't any noise problem at that time. We had no indication to test.

Frederiksen also testified that the solution to electrical noise problems can be readily accomplished by electronic designers:

Q. Is that something a competent electronic designer is familiar with to your knowledge, noise problems To your knowledge sir...?

A. Yes.

Q. If he encounters them, there are techniques for taking care of them to your knowledge?

A. Yes.

Q. Could you tell me what some of those techniques are?

A. RC networks, line filters, main power line, grounding of the main electronic chassis to the AC ground to dump any static discharges, shielding to prevent radiation in electronics, and ferrite beads on lead-in wires, voltage transient suppressors on different power supply wires, proper distribution of filter capacitors. Is that enough?

This testimony was elicited before it became necessary for Bally to raise the matter of noise before the Patent Examiner. Electrical noise is a non-issue created by Bally to achieve its ends in the ex parte proceedings of the Patent and Trademark Office.

None of the claims in issue here relate to any noise abatement techniques developed by Nutting and Frederiksen.

III. THERE WAS NO SKEPTICISM CONCERNING THE EVENTUAL ASCENDANCY OF MICROPROCESSOR PINBALL

For more than two years prior to the filing of the patent in suit, trade publications in the microprocessor field recognized the suitability of pinball as an application for microprocessors.

Leaders in the pinball industry were concerned about the cost and serviceability of microprocessor pinball games. There was no concern about the technical ability to achieve such a combination. "Only [technological incompatibility] ... is telling on the issue of nonobviousness." Orthopedic Equipment Co. v. U.S., 702 F.2d 1005, 1013 (C.A.F.C. 1983).

If there was misjudgment, it related to a miscalculation as to the suddenness of the decline in price of microprocessors. There existed no technical skepticism supporting the conclusion of nonobviousness.

IV. BALLY CANNOT PROVE COMMERCIAL SUCCESS COMMENSURATE WITH THE CLAIMS IN ISSUE

Bally relies heavily on alleged commercial success of its microprocessor games incorporating the Nutting and Frederiksen invention. In fact, Bally's commercial pinball games are all covered by later issued United States Patent No. 4,198,051 (the "Bracha patent"), as well as by other patents. Moreover, although Bally had a license agreement with Dave Nutting to pay royalties, such royalties were never paid for commercial games sold by Bally.

There is no justification for concluding that the commercial success of Bally's pinball games related in any

way to the invention of the '441 patent. In re Dill, 604 F.2d 1356, (CCPA 1979); In re Tiffin 448 F.2d 791 (CCPA 1971).

V. BALLY'S ALLEGATIONS OF COPYING ARE SIMPLY NOT TRUE

For more than three decades, Bally, Williams and Gottlieb and their predecessors have co-existed in Chicago as the three major pinball manufacturers. During that entire period of time, each company faithfully obtained each pinball machine released by the others. The competitive games have been scrutinized on a regular basis as a standard business practice.

The same happened when Bally's microprocessor games came out. They were examined and game play ideas were noted. Such conduct cannot support a conclusion that any invention of the '441 patent was copied.

VI. A BRIEF ANALYSIS OF THE VALIDITY ISSUE COMPELS THE CONCLUSION THAT THE '441 PATENT IS INVALID.

The Supreme Court case of Graham v. John Deere & Co., 383 U.S. 1 (1965) requires the court to look at the scope and content of the prior art, the differences between the prior art and the claims at issue, and the level of skill in the art. That exercise in this case will clearly establish the invalidity of the claimed invention.

A. Nutting and Frederiksen Were Two of Several to Follow the Suggestion to Apply Microprocessor Techniques to Pinball

A half dozen publications up to two years prior to the filing of the '441 patent recognized that microprocessors were ideally suited to control pinball games. The impediment if there was one, was cost. The pinball companies had become very efficient in manufacture. Mr. Ross Schier of Bally, Marketing Vice President, was quoted in November 1973:

"We've designed an electronic flipper machine where we could use solid-state devices - probably more in memory functions than anyplace else -- but found our costs were higher than if we used traditional methods and electromagnetic devices. We've gotten to be so proficient in the way we're making machines now that we've decided not to venture into solid state."

When efforts were undertaken to adapt a microprocessor to a pinball game, those efforts uniformly proceeded in the same direction as that later disclosed by Nutting and Frederiksen in the '441 patent. Prior to the filing of the patent in suit, efforts by Atari, by Ramtek and by Bally itself established the lack of novelty and the obviousness of the invention.

B. Bally's Brief Never Addresses the Differences Between the Claims and the Art and Ignores What Is the Level of Skill

Incredibly, Bally's Graham analysis suggests that this Court consider the differences between microcomputer pinball and electro-mechanical pinball in making its determination of validity. Bally even ignores the art that it wishes the Patent and Trademark Office to review during the reissue proceeding.

There is no difference between the claims and what was suggested by the electronics companies -- Intel, Motorola, and Pro-Log. Those companies suggested an architecture identical to that adopted by Nutting and Fredriksen. In fact the architecture of the '441 patent was likely copied by Nutting and Fredriksen from Intel publications. Others who adapted microprocessors to pinball all inevitably followed the same path. Pinball development at Atari, Ramtek and at Bally itself, in an independent development, used multiplexing techniques similar to those shown in the '441 patent.

Those familiar with microprocessors must be considered as persons of the relevant level of skill. In Digitronics v. New York Racing Association 553 F.2d 740, 745 (2nd Cir., 1977), the Court considered an invention that involved computerization of totalisators used in paramutuel betting:

"Once the art in which the ordinarily skilled person must be said to have knowledge is widened to include not only totalisators, but all of data processing, it is manifest that the patent claims here are obvious."

In Dann v. Johnston 425 U.S. 219, 229 (1976), the Supreme Court made a similar holding when considering an invention relating to adaptation of data processing systems to the banking industry:

While computer technology is an exploding one, '[i]t is but an even handed application to require that those persons granted the benefit of a patent monopoly be charged with an awareness' of that technology" [citing Graham 383 U.S., at 19].

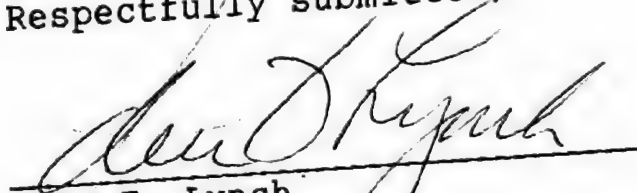
The Court will find the same when considering the '441 patent.

VII. CONCLUSION

The above is a brief treatment of the evidence which the Court will receive on the validity issue.

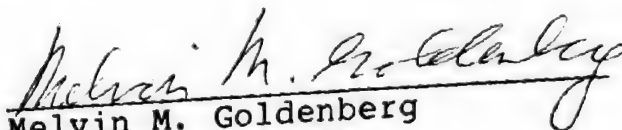
With respect to the issue of infringement, defendants will present evidence that any reasonable construction of the claims, pursuant to the last paragraph of 35 U.S.C. §112, will demonstrate that Gottlieb and Williams devices are neither the same nor equivalent to those claimed.

Respectfully submitted,



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WILLIAMS ELECTRONICS, INC.

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

BALLY MANUFACTURING CORPORATION,

Plaintiff,

v.

D. GOTTLIEB & CO., WILLIAMS
ELECTRONICS, INC., and ROCKWELL
INTERNATIONAL CORPORATION,

Defendants.

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Civil Action No.

78 C 2246

AMENDED NOTICE UNDER 35 U.S.C. § 282
AND STATEMENT COMPLYING WITH COURT ORDER
DATED DECEMBER 12, 1983

Pursuant to 35 U.S.C. § 282 the defendants hereby give notice to plaintiff that they may rely upon the patents and publications listed below as anticipations of the alleged invention of the patent in suit or as showing the state of the art; and that they may rely upon the persons listed below as prior inventors, or as having prior knowledge of or as having previously used or offered for sale the alleged invention of the patent in suit.

In Section I, the identified references are regarded by Defendants D. Gottlieb & Co. and Rockwell International Corp. as being those of predominant importance establishing invalidity of U.S. Patent Re 31,411. The references are ranked in the approximate order of what Defendants perceive as their overall significance. References cited by letter designation under a given number have roughly the same sig-

PLAINTIFF'S
EXHIBIT
A

nificance or have a significance because of their combined effect, e.g., the Intel advertisement and Intel Manual.

This notice in Sections II and II is intended to include the patents and publications cited in the Patent Office file history of the reissue Nutting et al patent and the file history of that patent's parent patent. The patents and publications believed to be cited in the Patent Office have been labelled with an asterisk. Additional patents and publications are also included herein; these do not have an asterisk.

I. REFERENCES RE 12/12/83 ORDER

- 1(a) *Intel MCS-4 Microprocessor Computer Set User's Manuals; Feb. 1973; all pages.
- 1(b) *Intel advertisement entitled "From Electronic Games to Blood Analyzers"; Electronics; pp. 18-19; Mar. 21, 1974.
- 2(a) The Designer's Guide to Programmed Logic; Pro-Log Corporation; Nov. 1973; all pages.
- 2(b) Pro-Log brochure entitled "Everything You Need To Get Into The Game"; pre-August, 1973.
- 3(a) *Special Issue - The Great Takeover; Electronics International; Oct. 25, 1973.
- 3(b) *"Electronics Plays the Pins"; EE/Systems Engineering Today; pp. 37(+); Nov. 1973.
- 3(c) *"Microcomputers Muscle In"; Electronics; pp. 63, 64; Mar. 1, 1973.
- 4 U.S. Patent No. 4,095,7950, dated 6/20/78, to Saxton.
- 5 *Fairchild Semiconductor; The TTL Applications Handbook; pp. 1-5 to 1-6, 3-1 to 3-24, 15-3 to 15-4; Aug. 1973.

- 6 *Bally Alley Service Manual; Bally Manufacturing Corp.; Jan. 1978 (sic); all pages.
- 7 U.S. Patent No. 2,864,619, issued 12/16/58, to Burnside.
- 8 Single-Chip Microprocessors Open Up a New World of Applications; Electronics; April 18, 1974; p. 81-95.
- 9 Microcomputer I, II; National Electronics Conference, 1974 (Bally documents 2206, 2207)
- 10 *Intel Corp. Intellect 4 Ref. Manual; 1974; all pages.

Also Defendants regard the following articles mentioning microprocessor controlled pinball games as widening the widespread knowledge of the applicability of microprocessors to pinball and will rely on them in addition to those articles listed in 3(a)-(c) above.

Business Week, "Microcomputers Aim At A Huge New Market", May 12, 1973, p. 180-182.

Electronic News, "Nevada Testing Chip-Controlled Gaming Machines", January 14, 1979, p. 48.

Peninsular News, "Pro-Log of Monterey...", April 8, 1974, (4 pages).

II. PATENTS AND PUBLICATIONS

A. PATENTS

U.S. PATENTS

<u>Number</u>	<u>Issue Date</u>	<u>Name</u>
*2,479,707	08/19/49	Durant
*2,618,486	11/18/52	Durant
*2,806,701	09/17/57	Durant
*2,864,619	12/16/58	Burnside

<u>Number</u>	<u>Issue Date</u>	<u>Name</u>
*3,642,287	02/15/72	Lally et al
*3,664,037	05/23/72	Budnik et al
*3,703,288	11/21/72	Vogel et al
*3,715,746	02/06/73	Hatano
*3,765,105	10/16/73	Montgomery et al
3,781,852	12/25/73	White et al
*3,809,395	05/07/74	Allison et al
*3,874,669	04/01/75	Ariano
*3,889,956	06/17/75	Castle
*3,931,966	01/13/76	Walker
*3,940,130	02/24/76	Fawcett
*3,946,220	03/23/76	Brobeck et al
*4,008,893	02/22/77	Yoseloff
*4,026,555	05/31/77	Kirschner
*4,087,855	05/02/78	Bennett et al
*4,095,795	06/20/78	Saxton

FOREIGN PATENTS

<u>Number</u>	<u>Issue Date</u>	<u>Country</u>
*2,038,597	12/28/70	France
*2,232,107	11/ /73	Germany
*1,430,007	03/ /76	Great Britain

B. PUBLICATIONS

"M6800 Microprocessor Applications Manual";
Motorola Inc.; March 1975; all pages.

"M6800 Microprocessor Programming Manual";
Motorola Inc.; March 1975; all pages.

The Designer's Guide to Programmed Logic; Pro-Log Corporation; Nov. 1973; all pages; and undated brochure entitled "Everything You Need To Get Into The Game"

*Bally Alley Service Manual; Bally Manufacturing Corp.; Jan. 1978 (sic); all pages.

*Popular Electronics; "Altair 8800"; Jan. 1975; pp. 33-38.

*Popular Science; "Games Computers Play"; Vol. 197, No. 4; Oct. 1970; p. 44.

*Electronics; "Motorola Joins Microprocessor Race with 8-Bit Entry"; Mar. 7, 1974; pp. 29-30.

*Intel MCS-40 User's Manual for Logic Designs - MCS-335A-175/15K; Nov. 1974, Jan. 1975; all pages.

*Intel Corp. Inteltec 4 Ref. Manual; 1974; all pages.

*Intel MCS-4 Microprocessor Computer Set User's Manuals; Sep. 1974, Feb. 1973, Mar. 1972, and Nov. 1971; all pages.

*GE Transistor Manual; 7th Edition; all pages.

*Motorola; "The Semiconductor Data Library"; 1973; all pages.

*Texas Instruments; "The Optoelectronics Data Book for Design Engineers"; 1st Edition; all pages.

*Bally Manufacturing Corp.; Bally Circus Queen Manual.

*"Technology-Shrinking Costs"; Electronics; pp. 69-102; Oct. 25, 1973.

*"N-channel MOS Technology Yields New Generation of Microprocessors"; Electronics; pp. 88-95; April 18, 1974.

*Intel advertisement entitled "From Electronic Games to Blood Analyzers"; Electronics; pp. 18-19; Mar. 21, 1974.

*Litronix Application Note 3 (4 pages); Nov. 1971.

*"Electronics Plays the Pins"; EE/Systems Engineering Today; pp. 37(+); Nov. 1973.

*"Microcomputers Muscle In"; Electronics; pp. 63, 64; Mar. 1, 1973.

*Special Issue - The Great Takeover; Electronics International; Oct. 25, 1973.

Single-Chip Microprocessors Open Up a New World of Applications; Electronics; April 18, 1974.

*Diverse Industry Users Clamber Aboard the Microprocessor Bandwagon; Electronics; July 11, 1974.

A Whole New Game (Probing the news); Electronics; June 27, 1974.

Electronic Calculators; H. Edward Roberts; 1974; all pages.

*Dataquest; Section 2.6.8; "Games"; pp. 1-16; Feb. 18, 1976.

*"Computers"; Electronics; pp. 90-102; Oct. 25, 1973..

*G. Lapidus; "Programmable Logic Controllers - Painless Programming to Replace the Relay Bank"; Control Engineering; pp. 49-60; April 1971.

*Rockwell International; "MOS/LSI Application Notes, Parallel Processing System (PPS)"; pp. 1-25; April 1973.

*L. Stern; "Microcomputers - Preparations for an Explosion!"; Motorola Monitor; pp. 4-11; Dec. 1973.

*Arthur D. Little, Inc.; "The Potential Impact of Microprocessor Technology"; ADL Impact Services; pp. 1-33; Dec. 1974.

*Quantum Science Corp.; Minicomputers & Microcomputers, The Squeeze is On"; pp. 79-82, 85-88, 113-14, 140-52, 211-18; May 1, 1974.

*"A Whole New Game"; Electronics; pp. 69-70; June 27, 1974.

*R. Butler; "Amusement Equipment Seen Growth Area for Devices"; Electronic News; p. 26; Dec. 30, 1974.

*G. M. Walker; "Consumer/Commercial Microprocessors Go Public"; Electronics; pp. 92-95; July 11, 1974.

*Information and Planning Associates; "Electronic Toys, Games & Amusements"; pp. 60-61; June 1976.

*Rockwell International; "Keyboard/Printer Controller Circuit"; Part No. 10815; pp. 1-14; April 1975.

*Dave Nutting Associates; "Bally Brain"; Sept. 26, 1975 (1974).

*Rockwell International, Data Sheet; "Parallel Processing System (PPS), General Purpose Keyboard and Display (GPKD) Circuit"; Part No. 10788; pp. 1-14; 1973.

*Ramtek's Presentation on April/May 1975 at Arilomas Conference on Microprocessor Pinball

*Brochures of Micromputer Associates, Inc. and of Compata, including those identified as GD213, GD214, BD22, BD23, and Holt Exhibits B, C, D1-D9, F, H and J.

*National Semiconductor; "MM5725 One Chip Calculator"; pp. 1-11; March 1973.

*National Semiconductor; "Calculator Learns to Keep Time"; pp. 1-8; Oct. 1974.

*Fairchild Semiconductor; The TTL Applications Handbook; pp. 1-5 to 1-6, 3-1 to 3-24, 15-3 to 15-4; Aug. 1973.

*Rockwell International, Application Notes; "MOS/LSI Timer-Controller-Sequencer (TCS) Device"; pp. 1-12; April 1972.

*Rockwell International, Application Notes; "Programming Manual for Timer-Controller-Sequencer (TCS)"; pp. 1-16; March 1972.

*Rockwell International, Application Notes; "MOS/LSI Timer-Controller-Sequencer (TCS) Device Evaluation Unit"; Part No. A0102NA; pp. 1-6; Dec. 1972.

"Microprocessor Design Series"; Design News;
July 22, 1974; Robert Cushman.

Microcomputer I, II; National Electronics
Conference, 1974 (Bally documents 2206, 2207)

"What Can You Do With A Microprocessor?"; EDN,
March 20, 1974; pages 42-48

III. PRIOR INVENTION, KNOWLEDGE, USE, SALE AND
STATE OF THE ART (BELIVED TO BE IN REISSUE FILES)

*1. Activities of Atari, Inc., Sunnyvale, California.

Persons having knowledge of the activities of this company include: Stephen Mayer, Larry Emmons, Edward Schleeter, Stephen Bristow, all of whom are employed by Atari, Inc. or Warner Communications and may be contacted through one or the other of those companies. Others who have knowledge of these activities include Joseph Robbins, Ross Scheer, William O'Donnel, Jr., William O'Donnel, Sr., John Britz, Alvin Gottlieb, Jodie Sperry, Gene Brand, and possibly other present or former employees of the plaintiff or one of its subsidiaries.

*2. Activities of Bally Manufacturing, Chicago, Illinois. Persons having knowledge of the activities include Collin Foster, William Engelhardt, Frank Bracha, John Britz, Joe Robbins, Ross Scheer and possibly other present or former employees of the plaintiff or one of its subsidiaries.

*3. Ramtek, Inc., Sunnyvale, California. Ray Holt, Manny Lemas, Charles McEwan, Hal Ivy, Gaman Schultz, Kenneth Agard, and possibly other present or former employees of Ramtek.

4. National Semiconductor Corporations, Santa Clara, California. Milton Schwartz, Keith Winter, Bernard Kute.

5. United Games, Portland, Oregon. William Guyton, Robert Thomas.

6. PRO-LOG Corporation, Monterey, California. Matt Biewer, Ed Lee, Keith Rosburg.

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CERTIFICATE OF SERVICE

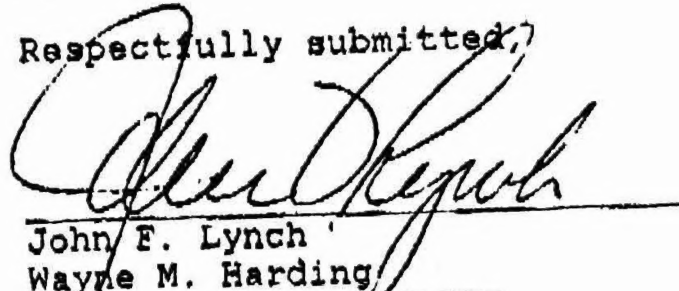
It is hereby certified that the foregoing NOTICE UNDER 35 U.S.C. § 282 AND STATEMENT COMPLYING WITH COURT ORDER DATED DECEMBER 12, 1983 was served on Plaintiff by telecopying same and depositing a copy of same in the United States mail, first class postage prepaid, to its attorneys, Donald A. Welsh, A. Sidney Katz, WELSH & KATZ, 135 South LaSalle Street, Suite 1625, Chicago, Illinois 60603, this 16th day of December, 1983.

4. National Semiconductor Corporations, Santa Clara, California. Milton Schwartz, Keith Winter, Bernard Kute.

5. United Games, Portland, Oregon. William Guyton, Robert Thomas.

6. PRO-LOG Corporation, Monterey, California. Matt Biewer, Ed Lee, Keith Rosburg.

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